Collaborative Governance in the Face of Global Change: A Social Science Approach to Working Effectively at the Human-Wildlife-Environment Interface

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Abstract

This dissertation explores the use of a collaborative governance framework for addressing a range of wildlife and environmental conservation issues. Conservation threats in general are often wide-reaching and interdisciplinary, meaning their impacts extend beyond what one organization or field has the resources and capacity to manage. Collaborative governance, a framework that outlines conditions and stakeholders necessary to work effectively across various boundaries like discipline, scale, and sector, is often used to address such conservation issues because of its ability to overcome such challenges. This dissertation comprises three standalone papers exploring the use of collaborative governance in three separate wildlife and environmental contexts.

The first paper focused on the State Wildlife Action Plan (SWAP) update process in the Southeastern United States leading up to the 2025 submission deadline. Using a qualitative semi-structured interview approach, this study explored how different agencies, organizations, and other entities collaborate to develop plan changes. This study focused particularly on how these plans address the movement of threatened and endangered species across state lines and how they incorporate climate change information as these are expected to worsen in coming years. Findings include the importance of trust, avenues for future collaborations, and the importance of regional agencies.

The second paper explored the development of an ecotourism circuit in Sierra Leone, with a focus on collaboration with local communities. Because tourism development has a strong history of excluding these groups, along with their wants, needs, and concerns, this study focused on assessing these constructs in two potential ecotourism development sites using a qualitative semi-structured interview approach. This ecotourism circuit development represents a unique opportunity to incorporate principles of collaborative governance and community engagement as there is not currently a well-established tourism sector in Sierra Leone. Most work on these concepts in tourism is done retroactively but employing them in Sierra Leone's tourism development can provide valuable information on the benefits and challenges of doing so more proactively. Findings include a desire among all groups for economic and infrastructure benefits, communication challenges between local communities and other stakeholders, and the importance of keeping ecotourism development in Sierra Leone manageable.

The third paper in this dissertation examined the use of the One Health framework in Sierra Leone. This framework emphasizes strong interconnections among human, animal, and environmental health, yet has historically overemphasized human health, particularly zoonotic disease transmission to humans. This imbalance is also present in Sierra Leone's use of One Health, which was formalized immediately after the 2014-2016 Ebola epidemic. The One Health framework, however, has much potential to effectively address other health and safety threats. In fact, expanding its use into other health and safety sectors will be necessary to take the holistic approach to health the framework strives for. This need is especially apparent in places like Sierra Leone, where environmental health threats like climate change, deforestation, urbanization, and natural disasters are rapidly increasing and pose a major threat to health and safety for humans, wildlife, livestock, and the environment. Collaborative governance represents

a valuable tool for better integrating these threats and the organizations tasked with addressing them into One Health. This study utilized a qualitative semi-structured interview and focus group approach to explore potential cross-boundary collaborations to initiate or strengthen, challenges to such collaborations, and the most significant health and safety threats. Findings confirm environmental health threats that are rapidly growing, willingness to better incorporate said threats into One Health work, and challenges in putting collaborative plans and policies into action.

Taken as a whole, this dissertation identifies valuable, novel uses of the collaborative governance framework to improve management of threats at the human-animal-environment interface. It explores trends in collaborative governance drivers and challenges, contributing to more effective work in both the specific study settings and in general.

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General Audience Abstract

Wildlife and environmental conservation issues are often wide-ranging and require involvement from agencies, organizations, and individual from a variety of backgrounds and fields of study, including but not limited to biology, geography, engineering, policy, and social sciences. Because these fields often deal with different forms of information and address problems in different ways, it can be challenging to align their goals, strategies, and even interpersonal skills like communication methods and conflict resolution. Collaborative governance, a framework that provides guidance on what kinds of groups and individuals are important to include and conditions necessary to make collaborations more successful, can be incredibly useful in such contexts. This dissertation utilizes the collaborative governance framework in three environmental and wildlife management study settings.

The first study in this dissertation focused on State Wildlife Action Plans (SWAPs) in the Southeastern United States. It is comprised of interviews with a range of wildlife planners and professionals on their experience in developing and updating SWAPs, particularly as factors like climate change grow and shift, with potential major impacts on wildlife in the study region. Interviews also explored how various conservation agencies and other organizations work together on these plans, particularly across boundaries like state lines or fields of study. Findings include the importance of trust in collaborations and the role of agencies or organizations dedicated to managing cross-boundary collaborations.

The second study in this dissertation examined ecotourism development in Sierra Leone. It focused on the role and experience of communities located around sites where ecotourism programs are being developed. More specifically, this study focused on what benefits communities would like to see result from ecotourism, their concerns about implementing the programs, and whether they felt meaningfully included in ecotourism planning. Findings include a consistent desire for economic, employment, and infrastructure development (construction of schools, water wells, etc.) as a result of ecotourism and challenges around communications between communities and other organizations involved in the project.

The third study centered on addressing environmental health and safety risks through the One Health framework in Sierra Leone. One Health is an approach that incorporates many different fields of study to address the strong connections among human, animal, and environmental health. However, it typically focuses disproportionately on the human health component and diseases that spread from animals to humans. In places like Sierra Leone, environmental health threats like natural disasters and access to clean food and water are becoming increasingly dangerous. This study examined challenges and opportunities to expanding and strengthening collaborative efforts to address these threats through Sierra Leone's One Health platform. Findings revealed overwhelming willingness to better integrate the environmental sector as well as challenges to doing so.

Overall, this dissertation addresses collaboration across boundaries like state lines, fields of study, and roles in addressing threats and challenges related to environmental and wildlife conservation. It explores trends in what makes these collaborations successful, what is challenging about them, and where they need to be strengthened or initiated in the three study

sites. Additionally, results can help inform more general work in these fields, contributing to more effective cross-boundary collaborations in a variety of settings.

Dedication

This dissertation and the work that went into it are dedicated with endless love to my dear friend, Sidikie Bayoh. Sidikie was an incredibly kind, passionate, brilliant force for Tacugama and conservation in general. He inspired and supported me throughout this dissertation, particularly during data collection of Studies 2 and 3 in Sierra Leone. This research contains so many flashes of his impact and presence behind the scenes, both directly in guiding me on potential interviewees and indirectly in the constant joy and light he brought to life at Tacugama as I worked. His role deserves explicit acknowledgement and appreciation, hence this dedication. As painful and profound as losing him in the midst of analysis and writing was and as much as I wish he was here to see the outcome of this work, I am endlessly grateful for his help and for how this dissertation helped me continue to feel connected to him. Mek in sol rɛst in pis, Sidikie.

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I am also extremely grateful to the other members of my committee: Dr. Tara Teel, Dr. Willandia Chaves, and Dr. Paroma Wagle. Tara has been a consistent figure in my life for the past few years since serving as my master's capstone advisor and having another opportunity to work with her and learn from her has been an incredible privilege. Willa and Paroma have both been extremely generous in giving me an open door to ask for help or guidance at any point in this process and have given valuable feedback on my work, making this writing and my critical thinking abilities much stronger. I could not have imagined a better committee. In addition to all they have contributed to my development, I have genuinely enjoyed getting to know all four members as the wonderful people that they are.

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this type of work, a skill that I think will be incredibly important as I look towards shifting into a career.

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I am also beyond grateful to the Interfaces of Global Change (IGC) and Global Change Center (GCC) for challenging my views of research and the world and providing a forum for connecting with professors and other students from different departments. Additionally, Chapter 4 would not have been possible without the generous funding from the GCC Synergy Grant program. I have great hope that this project will have value for environmental health in Sierra Leone. This component of my dissertation was the most meaningful and impactful on a personal level and that would not have been possible without this grant.

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Table of Contents

List of Tables and Figures

Attribution

This dissertation consists of three scholarly journal articles, all of which involved significant collaborations from various co-authors.

Paper 1 (Chapter 2)

Dr. Todd Schenk and Dr. Paul Armsworth are listed as co-authors on this article. Both contributed greatly to this project. In particular, Dr. Schenk worked closely with me to design the semi-structured interview protocol, conducted most interviews along with me, collaborated with me to perform the inter-coder reliability check, and contributed to writing and editing the manuscript. Dr. Armsworth took on a major role as Primary Investigator of the whole CNH-2 project, meaning he worked tirelessly to connect us to other team members, valuable people to interview in the wildlife policy world, and relevant literature to explore. He also contributed to writing and editing the manuscript. At the time of writing, Paper 1 is currently in review with *Society and Natural Resources*.

Paper 2 (Chapter 3)

Dr. Todd Schenk is listed as a co-author for this article. He contributed greatly in designing the semi-structured interview protocol and was a valuable resource in troubleshooting next steps for the project in a rapidly changing context. He also performed the inter-coder reliability check and assisted in writing and editing the manuscript. At the time of writing, Paper 2 is currently being prepared for submission.

Paper 3 (Chapter 4)

Paper 3 in particular is the result of incredible collaboration of individuals across disciplines and countries. Dr. Todd Schenk and Dr. Gillian Eastwood were both significant partners in designing this study and contributing to writing and editing the manuscript. Ibrahim Kamara was our in-

country partner and invaluable in assuring our work was culturally appropriate and relevant to real issues. He assisted with our focus group and also performed the inter-coder reliability check with our transcripts. At the time of writing, Paper 3 is currently being prepared for submission.

Chapter 1: Introduction

Many agencies and their partners are increasingly turning to collaborative governance approaches to address a wide variety of environmental and wildlife governance challenges. Funding and capacity issues, cross-scale and cross-jurisdictional environmental threats, and the politicization of environmental issues make collaborative governance an appropriate framework (Abrams et al., Bodin, 2017). Utilizing collaborative governance in this context, however, is not without challenges. Environmental and wildlife issues can be very emotionally charged, influencing actors' willingness to compromise (Emerson & Gerlak, 2014; Lemieux et al., 2015). Issues can also be very complicated to acknowledge and address, particularly by government agencies, which can impact attentiveness and available funding (Leck & Simon, 2013). These challenges by no means preclude the use of collaborative governance for addressing environmental and wildlife issues, but they do mean that efforts to do so should be deliberate and sustained. This requires investment in collaborative capacities and genuine commitment on the part of agencies and other organizations.

This dissertation explores the application of collaborative governance models in three different situations: 1) Collaboration among state agencies, tribes, and other stakeholder groups both within and across state boundaries around the development and implementation of State Wildlife Action Plans (SWAPs); 2) nascent efforts to develop an ecotourism industry in Sierra Leone, West Africa in a way that genuinely engages communities; and 3) the broadening of Sierra Leone's One Health framework to fully integrate environmental dimensions. Each of these cases has its own unique characteristics, opportunities, and challenges; what unites them is the possibility of enhancing human and environmental wellbeing by bringing actors together to enhance planning and management.

Collaborative governance: Overview

Broadly speaking, collaborative governance is an approach to decision-making and management that involves in-depth involvement of a variety of relevant stakeholders. It is often used when "adversarial or managerial approaches" have not worked or implementation of decisions has proven expensive and/or politicized (Ansell & Gash, 2008). Collaborative governance is generally undertaken to resolve issues with management of public goods and policies and starts with agreement on problem definitions and desired outcomes by relevant stakeholders (Bianchi et al., 2021; Bryson et al. 2015). Requirements for participation vary; some mandate involvement of nonstate actors (Ansell & Gash, 2008), while others simply prescribe inclusion of a variety of relevant actors across boundaries (Emerson & Gerlak, 2014). Commitment to the process is required of stakeholders at all stages and their contributions should all be included when making governance decisions (Ansell & Gash, 2008; Bianchi et al., 2021).

As a result, willingness of stakeholders to listen to and consider all major points of view put forward by others is necessary for successful collaborative governance (Innes & Booher, 2018). Other factors influencing the outcomes of approaches include facilitative leadership, which is important in building trust and encouraging the process (Bryson et al., 2015; Emerson & Gerlak, 2014; Innes & Booher, 2018); ground rules and shared understanding of processes (Ansell & Gash, 2008); and individual openness to collaboration and concern for common good (Bryson et al., 2015).

Overemphasis on desired individual characteristics, however, may lead to overrepresentation of "easier" stakeholders. This consequence is one example of the many challenges to achieving true representation, which is essential to the success of the process, acceptance by wider public audiences, and consideration by legislators (Bianchi et al., 2021;

Innes & Booher, 2018). Even with true representation, facilitators may need to manage power imbalances because they can impact incentives for groups to be involved, and thus consideration of their needs (Cundill et al., 2019; Jamal & Stronza, 2009).

Despite the challenges, many agencies and other organizations choose to undergo collaborative governance processes because of the benefits they can have. These processes often allow stakeholders to pool resources (Emerson & Gerlak, 2014); save time later (Ansell & Gash, 2008); build trust (Innes & Booher, 2018); grow understanding and foster shared learning about issues (Innes & Booher, 2018); and develop more adaptable, effective plans than any one entity could produce on their own (Bryson et al., 2015; Emerson & Gerlak, 2014).

Collaborative governance: Utility in environmental and wildlife governance

Collaborative governance's utility in overcoming boundaries, facilitating the sharing of information and resources, and fostering the inclusion of a variety of relevant stakeholders are all useful in addressing environmental governance issues. First, environmental and wildlife issues and threats almost always occur across spatial and/or jurisdictional boundaries and thus require involvement of actors at a variety of scales (Abrams et al., 2021; Bodin, 2017; Lemieux et al., 2015). Additionally, smaller-scale threats may aggregate at a larger-scale, which could be missed without input from actors at a variety of scales (Schultz et al., 2019). Collaboration of some kind among actors is necessary to effective management in such cases (Bodin, 2017; Schultz et al., 2019), and collaborative governance in particular can be extremely useful because of the variety of stakeholders actively engaged.

Second, the inclusion of a range of relevant actors can be an asset in increasing the legitimacy of environmental wildlife threats and management actions. The perceived legitimacy of environmental and wildlife organizations has seen a general decline over the past few decades,

but is critical to their success in governance, particularly around highly contested issues (Abrams et al., 2021). Collaborative governance can address this decline because diversity in stakeholders can drive increases in legitimacy in the eyes of both the general public and politicians (Innes & Booher, 2018). As a result, collaborative governance can be a useful approach for increasing acceptance of the importance of environmental and wildlife issues and initiatives.

Acknowledgement of issues and approaches, however, is only part of the battle. Resource availability, lack of funding, and capacity issues are frequent obstacles to effective environmental and wildlife governance. Collaborative governance allows actors to maximize resources and information by creating pathways for sharing them with each other (Abrams et al., 2021; Emerson & Gerlak, 2014; Lemieux et al., 2015; Schultz et al., 2019). This redistribution of resources can be particularly impactful in the face of inequalities. For instance, in some cases, the capacity and resources of nongovernmental organizations make them well suited to assist government agencies with the monitoring of threats and interventions (Schultz et al., 2019). This monitoring may also uncover conditions necessitating adaptability, as is often the case with environmental and wildlife threats (Abrams et al., 2021), and which government actors may or may not be well equipped to address (Lemieux et al., 2015). Collaborative governance can be useful in such instances because it allows for increased agility and responsiveness to threats (Emerson & Gerlak, 2014).

Challenges of collaborative governance approaches in environmental & wildlife governance

Collaboration in environmental and wildlife governance can be challenging because of how complex, politically charged, and constantly evolving such issues and threats are. These challenges can be framed a variety of ways, including economic, social justice, and concern for the environment and wildlife species themselves (Leck & Simon, 2013). The lens actors use

greatly impacts how they approach planning and management, namely in how they conceptualize issues, determine the level of urgency required, and prioritize different outcomes, such as human wellbeing and environmental health (Leck & Simon, 2013). As a result, those working on environmental and wildlife issues often perceive a lack of common goals, which impacts willingness to engage in collaborations regardless of the accuracy of those perceptions (Lemieux et al., 2015).

Contentious environmental and wildlife issues result in even further barriers to collaborative engagement. Government agencies in particular may be hesitant to work on such issues, which can have a major negative impact on both the effectiveness of collaborations and the resources devoted to management (Leck & Simon, 2013). Controversy in general can make consensus-building near impossible, often resulting in legislation that is vague and insubstantial (Emerson et al., 2017). And in the face of conflicting priorities and needs, government agencies can enjoy a power advantage because they are often able to veto decisions in environmental governance (Abrams et al., 2021). Collaborative governance depends largely on minimizing power imbalances, so this power advantage can decrease the legitimacy of the process in the eyes of other stakeholders and decrease their investment in the process (Ansell & Gash, 2008).

Key components of environmental and wildlife governance in collaboration

Overall, collaboration can be particularly difficult to navigate in conjunction with environmental and wildlife governance because of how many seemingly unrelated factors impact how those issues develop and present. So, when using this approach in such contexts, it is critical to look beyond the immediate problem to see how history, economics, human health, values, and various other factors are influencing all stakeholders.

Power imbalances like those described above are one such factor that can have a major impact on the success of environmental and wildlife collaborations. Internationally, conservation challenges that involve both developed and developing countries can be particularly fraught with power differentials. For example, developing countries typically face environmental consequences completely out of proportion to their contributions to environmental threats (Ajibo, 2016). Developed countries often pass on environmental impacts they face such as hazardous waste disposal, exposing developing nations to further pollution and environmental risks (Ajibo, 2016). Developed nations often then come in with funds, resources, and the kind of information typically favored by the scientific community, all of which purport notions of "haves" and "have nots" (Broesch et al., 2020). This dynamic can lead to economic and resource dependence on developed countries (Cundill et al., 2019). Historical injustices, including colonial legacies, further influence perceptions of power (Cundill et al., 2019). All of these factors combine to fuel both explicit and implicit power imbalances in favor of those from developed nations, which can impact how those from developing nations both contribute to and are incorporated into collaborative governance.

Collaboration in environmental and wildlife governance is not simple or straightforward. In addition to the political challenges outlined above, collaborative governance for managing environmental and wildlife challenges requires consideration of what makes those issues contentious on individual and group levels. These challenges are context dependent to a degree, but one thing that can make environmental and wildlife threats particularly heated is that conflicts around them generally arise out of differences in values and world views, making opinions very deep-seated and personal (Emerson et al., 2017). The connection between human

wellbeing and both environmental and animal health can introduce further emotional complications and make conflicts difficult to navigate (Emerson et al., 2017).

Collaborative Governance Cases: Dissertation Outline

Paper 1 (Chapter 2): State Wildlife Action Plans in the Southeastern United States

The second chapter of this dissertation explores how states in the U.S. Southeast are incorporating climate change information and collaborating with a variety of actors as they update their State Wildlife Action Plans (SWAPs) before the 2025 deadline. Interview results revealed this context to be unique with regard to collaborative governance for several reasons, including the processes taking place at the state level. First, even neighboring states can be drastically different in terms of resources like personnel and funding because state wildlife agency funding depends on many factors like population size and fishing/hunting license sales. Capacity also varies depending on which nongovernmental organizations (NGOs) are active in any given state and how well resourced they are. In addition, SWAPs can be very different state-by-state because apart from eight required elements, there is a great deal of flexibility as far as the content and structure of each plan. Finally, collaborative governance is unique in this context because regional entities like the Southeastern Association of Fish and Wildlife Agencies (SEAFWA), the Southeastern Climate Adaptation Science Center (SECASC), and the Southeast Conservation Adaptation Strategy (SECAS) exist largely to aid regional collaboration efforts. As a result, collaboration is already fairly developed for wildlife action planning in the area but can still be strengthened.

Strengthening collaboration across borders in the Southeastern United States will only grow in importance over time. It is critical to acknowledge the impacts climate change will have on species conservation in this area. As threats like changes in temperature, rainfall, and sea-

level intensify, many species will have to shift geographically in order to remain in their ideal climate habitat (Coristine & Kerr, 2015; Parmesan, 2006). A great deal of these shifts will take place across state lines, which means there is uncertainty around how to manage species that had state-level protections in their previous homes under policies like SWAPs (Aycrigg et al., 2013; Rezaei et al., 2023). These shifts have already started to some degree but are predicted to increase in speed and frequency in the coming years (Coristine & Kerr, 2015). As a result, cross-state collaboration is increasingly important to develop because it will allow states to work together in planning for shifting species and to incorporate such planning into their updated SWAPs.

Strengthening collaboration across boundaries in this context faces unique challenges that require modified approaches. While increased sharing of information is typically a major focus of developing collaborations (Lemieux et al., 2015), that is insufficient in this case. Many of the interviewees in this study explained that currently in this region, the issue is not a lack of climate information or models, but rather how to interpret and use them in real-world planning. They stated that expertise in doing so was limited, but that regional organizations like SECAS have been working to fill that gap and share tools for interpreting climate data with states. In this sense, collaborative governance needs to go a step further and include use of information when considering how to make information sharing useful to states preparing to face climate change impacts.

Paper 2 (Chapter 3): Ecotourism development in Sierra Leone

Tourism throughout Africa has historically failed to incorporate local community needs and desires in program development and to distribute economic and other benefits fairly. Local employees have often been underpaid, unacknowledged, and viewed as more or less disposable

(Cleveland, 2021; Harilal & Tichaawa, 2020). Even when this inequity is not deliberate, positive impacts of tourism do not necessarily trickle down to the community level (Kuvan & Akan, 2005). Ecotourism and tourism adjacent to protected lands can place additional burdens on local communities through limitations on land and resource use (Acquah et al., 2017; Thondhlana & Cundill, 2017). More recently, though, tourism planners and developers have been making much more of an effort to consider and incorporate local communities into existing operations (Siakwah et al., 2019). Sierra Leone, a small country in coastal West Africa where the systematic development of tourism projects is only beginning (Kongoley-MIH, 2015; Shakya, 2009), has an opportunity to incorporate those needs much earlier on in the process. Collaborative governance may be very useful in this case because of the framework it provides for integrating opinions, wishes, and concerns of a range of stakeholders, in this case including local community members.

The history of tourism planning in Sierra Leone is also an important factor to consider when utilizing collaborative governance approaches. Because this planning has been initiated multiple times before now (before the civil war started in 1991 and before the Ebola epidemic of 2014), expectations of its success and economic benefits have ballooned (Kongoley-MIH, 2015; Shakya, 2009). This expectation was clear in many interviews when asking local community members, government officials, and tourism operators about desired benefits. Members of each group were confident that there would be large increases in available jobs and overall economic growth. The reality, however, is that benefits may not be widely distributed and the ones that do become a reality may take years to develop (Kuvan & Akan, 2005), making ecotourism a more viable option as one portion of livelihood development (Mutanga et al., 2022; Tarino & Purnomo, 2024). Interviews with government officials revealed that they are deliberately keeping

ecotourism development small and manageable, which makes this outcome all the more likely. Therefore, clarity and honesty are imperative to collaborations focused on ecotourism development, particularly those with local community members, to avoid making false promises around what benefits can be expected. Interviews with both tourism developers and local community members revealed that agreements or shared plans for what benefits to expect and when have much room for improvement.

Collaborations with local communities will also require additional considerations. The interviews conducted for this study revealed that one of the most significant challenges to this work is likely pre-existing tensions among communities and between communities and other stakeholder groups. Some of these tensions were related to unrealized expectations of benefits from various programming, including tourism development. Collaborative governance will be helpful in both understanding current relationship dynamics and in shaping efforts to strengthen them. For example, this framework aligns well with one interviewee's suggestion of keeping an employee in the Jaibui area permanently or semi-permanently to demonstrate their investment in the relationship, build trust, and provide ample opportunities for stronger communication (Cossengue et al., 2025; Tarino & Purnomo, 2024).

Paper 3 (Chapter 4): One Health and conservation in Sierra Leone

One Health, in general and in Sierra Leone, represents a unique opportunity for studying collaborative governance because partnerships among certain disciplines are so well developed while others are close to nonexistent. The field has a strong emphasis on zoonotic disease transmission and disease vector ecology, which is evident in research and policy collaborations with public health and related fields (Agbo et al., 2019; Zhao et al., 2022). Although One Health ideologically encompasses a greater variety of fields due to the connections it draws with a wide

range of human, animal, and ecosystem factors (Mackenzie & Jeggo, 2019), interdisciplinarity is limited in practice. For instance, despite the attention to ecological health given in One Health definitions and frameworks, little to no work has been done on deforestation and its impacts on erosion, natural disasters, and spread of infectious diseases. As a result, collaborations between One Health work and the fields of agriculture and forestry in Sierra Leone have been minimal but are extremely promising.

Investigating such collaborations in Sierra Leone necessitates consideration of the unique historical context that has led to forestry and agricultural threats the nation now faces. The current state of deforestation and land development around the capital city of Freetown is strongly connected to the country's 1991-2002 civil war, which left millions of citizens internally displaced. Many of them resettled in the Freetown peninsula and development encroached on nearby Western Area Peninsula National Park (WAPNP) (Gbanie et al., 2018). Deforestation and illegal timber harvesting have continued in the decades since and the resulting soil erosion has threatened ecological integrity and human wellbeing (Fayiah, 2021; Larson et al., 2016). Research has connected this habitat degradation to a deadly landslide in 2017, and the risk of further natural disasters remains high (Cui et al., 2019).

Semi-structured interviews and a focus group conducted for this study reveal broad consensus among government agencies, nongovernmental organizations, and researchers on the growing risk of environmental threats in Sierra Leone. Additionally, interviewees and focus group participants express broad support for expanding collaborations to better incorporate the environmental entities in order to address these environmental threats. However, they also revealed a significant imbalance in One Health governance skewed towards the Ministry of Health and Sanitation. Sierra Leone's One Health platform is located within the Ministry of

Health and Sanitation, so it has a disproportionate amount of control over what issues are prioritized. Additionally, interviewees explained that, relative to other agencies, the Ministry of Health and Sanitation has access to a great deal more resources, capacity, and funds. A collaborative governance approach has potential to be useful in this instance as a tool for correcting this imbalance so that cross-boundary collaborations are more equal and more effective at addressing a wider range of health and safety threats in Sierra Leone.

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Chapter 2: Species conservation, collaborative governance, and global change: Climate change and cross-boundary collaboration in State Wildlife Action Plans

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Abstract

As climate change and other global threats grow and evolve, species statuses and geographic distributions are predicted to change. Conservation actors need to become increasingly flexible and adaptive, particularly with regard to increasing and strengthening collaborations. This study focused on planning efforts in State Wildlife Action Plan (SWAP) updates in the Southeastern United States, a landscape critical to the future of U.S. biodiversity. We conducted semi-structured interviews with key actors involved in biodiversity protection, including state agencies, federal programs, and non-governmental organizations. We focused on how these organizations approach species management, both individually and collaboratively, perceived opportunities for enhancing collaborations, and evaluated obstacles to effective adaptation and collaboration. Results include the importance of trust, avenues for future collaborations, and the importance of regional agencies. This work has shown the importance of understanding different perspectives on collaboration in wildlife management and planning given coming changes and limitations on time and resources.

Introduction

Climate and other global changes may lead to a rebalancing of responsibilities among various actors and political jurisdictions around environmental management issues (Coristine & and Kerr, 2015; Parmesan, 2006). Addressing these changes and the associated uncertainties may benefit from collaborative governance techniques. For example, as the climate changes, species

increasingly need to move across varied ecological and sociopolitical landscapes to track climatologically suitable conditions, with many crossing boundaries like state lines and appearing in new ecosystems (Aycrigg et al., 2013; Martinuzzi et al., 2015; Reinhardt et al, 2020; Rezaei et al., 2023). Conservation of these species will require new models of collaboration and shared decision-making approaches among government and civil society actors. This paper explores opportunities for enhanced collaboration and adaptive capacity in species conservation via a case study of how actors in the Southeastern United States are conceptualizing climate-induced migration while updating their State Wildlife Action Plans (SWAPs).

Adaptation and Collaborative Governance: Need and Current State

Conservation organizations will need to be increasingly flexible as threats to biodiversity change, increase, and drive more rapid ecosystem and species shifts (Armsworth et al., 2015; Barr et al., 2021). Addressing growing and unpredictable threats will likely involve shifting from a resistance paradigm, which focuses efforts on preserving current ecosystem conditions, to an adaptation paradigm, which involves working more dynamically to manage coming environmental changes (Clifford et al., 2020). This change can be daunting for organizations because of policy constraints (Murphy & Weiland, 2014); lack of resources (Clifford et al., 2020); risk aversion on part of actors (St-Laurent et al., 2022); and lack of information (Jantarasami et al., 2010; Lonsdale et al., 2017). However, overcoming these challenges is critical as striving to maintain the status quo becomes more difficult, resource intensive, and unrealistic (Clifford et al., 2020; Lemieux et al., 2015; West et al., 2009). Furthermore, adaptations will likely need to take place much more rapidly than in the past as environmental threats accelerate (Bierbaum et al., 2013; Ripple et al., 2020).

Implementing more effective and flexible collaborative governance systems is one avenue for improving species protection efforts across boundaries, among agencies, and with nongovernmental actors. Collaborative governance involves decision-makers and other actors working across geographical and agency boundaries, governance levels, and disciplines to build consensus around approaches for dealing with threats (Ansell & Gash, 2008; Emerson & Gerlack, 2014). Collaborative governance is particularly useful in dealing with environmental issues because they almost always occur across spatial and jurisdictional boundaries and involve multiple dimensions and sectors with different interests and priorities. Thus, they require involvement of actors at a variety of scales and with a range of both expertise and perspectives (Abrams et al., 2021; Bodin, 2017). Greater collaboration can be especially impactful in instances where political boundaries like state lines differ significantly from ecological boundaries, leaving actors unable to respond optimally to changing threats (Potts, 2020; Yocum et al., 2022). Thus, strengthening collaborative governance approaches holds promise for improving regional conservation efforts. While collaborative governance approaches do not necessarily explicitly include private and other actors, we view their involvement as critical given the challenges and complexities posed by current environmental threats and involved in addressing them. For instance, addressing climate change and its environmental impacts is increasingly difficult due to both inadequate funding and capacity, as well as major political limitations associated with prioritization and even the acknowledgement that it is a serious issue (Abrams et al., 2021; Potts, 2020; Timberlake & Schultz, 2017; Yocum et al., 2022).

Collaborative governance regimes that include private and non-governmental actors are crucial to overcoming limitations of money and manpower because they can increase the effectiveness of strategies, facilitate sharing of information and resources, increase adaptive

capacity, and expand geographic boundaries (Abrams et al., 2021; Armsworth et al., 2015; Emerson & Gerlak, 2014), Additionally, the perceived legitimacy of environmental organizations has seen a general decline over the past few decades, but is critical to effective environmental governance, particularly around highly contested environmental issues (Abrams et al., 2021). Collaborative governance can address this decline because diversity in stakeholders can drive increases in legitimacy of environmental threats and management actions for both the general public and politicians (Innes & Booher. 2018).

Lack of resources, inconsistencies in goals and timelines, and lack of legislative, regulatory, and political support can limit collaboration (Cundill et al., 2019; Leck & Simon, 2013). Additionally, collaboration in environmental governance can be challenging because of how complex, politically charged, and constantly evolving the issues and threats are. There can be differences in how actors approach planning and management, namely in how they conceptualize issues, determine urgency required, and prioritize different outcomes, such as economic development versus environmental health (Leck & Simon, 2013). As a result, those working on environmental issues often perceive a lack of common goals, which impacts willingness to engage in collaborations regardless of the accuracy of those perceptions (Lemieux et al., 2015).

That said, a "collaborative mindset" rooted in trust, effective communication, openness to learning, and involvement of a variety of actors, can foster collaborations and increase the chances of success (Bryson et al., 2015; Lemieux et al., 2015; Merritt & Kelley, 2018; Ulibarri et al., 2023). In addition, the presence of cross-boundary organizations can aid collaborations, especially those that work between science and practice (Timberlake & Schultz, 2017). Other key components of successful collaborative governance identified in a recent large systematic

review include conflict resolution mechanisms, monitoring, and institutional adaptability (Carr Kelman et al., 2023).

Our study focused on the current state of collaborative governance, as well as factors that may either facilitate or limit its development, in the Southeastern United States as state governments and other organizations update their plans for addressing threatened and endangered species. As climate-related and other environmental threats in this region change and increase (Clifford et al., 2020; Timberlake & Schultz, 2017), species will have to shift geographically to remain in their ideal habitat (Lawler et al., 2013; Zhu et al., 2021). Shifts that take place across state and other boundaries will introduce unique governance and management challenges, such as inconsistencies in species protection and management of species deemed protected in some jurisdictions but not others (Lemieux et al., 2015). Thus, preparation and planning for cross-boundary collaborations before these shifts escalate will be imperative and greatly increase the likelihood of success in species conservation.

Study Focus: State Wildlife Action Plans in the United States

An examination of whether ideas from collaborative governance may be helpful for species conservation in light of future changes is timely in the United States. The most vulnerable species in the United States benefit from protection under a federal statute, the U.S. Endangered Species Act (ESA). However, many responsibilities for implementing actions to protect ESA listed species fall on states and other actors (Sims et al., 2023). States and other actors also lead on efforts to protect other species from declining to the level that they require this federal protection. Specifically, states' species management actions are guided by State Wildlife Action Plans (SWAPs). In these plans, states identify Species of Greatest Conservation Need (SGCN) within their boundaries, the habitats that support these species, threats they face,

and management actions that can help alleviate these threats. Most U.S. states and territories were required to submit initial SWAPs in 2005 and are required to submit updated versions at least every ten years (Oberbillig, 2008). Conservation projects working to protect SGCN are eligible for federal funding in the form of Tribal or State Wildlife Grants (SWG) from the federal government (Association of Fish and Wildlife Agencies, n.d.). Competitive State Wildlife Grants (C-SWG) provide additional federal funding for projects focused on conserving SGCN across state lines (U.S. Fish and Wildlife Service, 2024).

We utilized a qualitative semi-structured interview approach to investigate how prepared wildlife professionals in the Southeastern U.S. feel in the face of increasing and changing threats and their impacts on species, as well as how stakeholders collaborate across boundaries to manage threats and species changes. At the time of writing, many states are working on new SWAPs, which are due to be published in 2025. This timing provides a unique opportunity to explore if and how states are collaborating with each other and other actors in creating their updated plans. This paper focuses both on SWAP collaboration in general and more specifically on collaborations among neighboring states and other entities in preparation for shifting species ranges. We also included questions about the process of making alterations to SWAPs in order to better understand how entities can adapt to coming shifts in climate change impacts and other threats. SWAPs will dictate much of how states approach conservation during the next ten years, so investigating how they approach collaboration and changes to the plans will indicate where species conservation is headed in the U.S.

Methods

Study Site: Southeastern United States

This study focuses on the Southeastern United States, which is expected to experience significant challenges in the face of environmental threats and the species migration they precipitate. For instance, climate models predict that changing environmental conditions will lead to significant shifts in the ideal habitats of protected species, and that many of those species will rely on corridors like the Appalachian Mountains as future habitat or connections to sites farther north (Lawler et al., 2013; Zhu et al., 2021). As such, this study aims to understand the current state of those collaborations and where different groups of actors see potential for improvements in this region. For the purposes of this study, the *Southeastern United States* is defined as those states within the Southeastern Association of Fish and Wildlife Agencies (SEAFWA) region. Relevant acronyms for this study are included in Table 2-1.

Table 2-1: Relevant acronyms

	Acronym	Description
Organizations		
Association of Fish and Wildlife Agencies	AFWA	Represents North America's state, provincial, and territorial fish and wildlife agencies and facilitates collaboration among them and other entities
• Southeastern Association of Fish and Wildlife Agencies	SEAFWA	Regional AFWA focused on the Southeastern United States
Climate Adaptation Science Centers	CASCs	United States Geological Survey program to share research-based climate information with practitioners to facilitate climate adaptation for the both the environment and people
• Southeastern Climate Adaptation Science Center	SECASC	Regional CASC focused on the Southeastern United States
Eastern Band of Cherokee Indians	EBCI	Federally recognized tribe based in Western North Carolina
Northern Institute of Applied Climate Sciences	NIACS	United States Department of Agriculture Forest Service cross-boundary collaborative providing interdisciplinary information and research on climate change
Southeast Conservation Adaptation Strategy	SECAS	Regional organization focused on addressing threats to natural and cultural resources
Legislation		
Recovering America's Wildlife Act	RAWA	Proposed legislation to provide states and territories an additional $1.3 billion and tribes $98 million for implementing SWAPs
State Wildlife Action Plan	SWAP	State and territory specific plans for addressing threats to and protecting SGCN

• Species of Greatest Conservation Need	SGCN	One classification of state protected species; identified in SWAPs
Funding Sources		
Competitive State Wildlife Grants	C-SWG	Funding opportunities for cross-boundary collaborations implementing SWAP objectives
State Wildlife Grants	SWG	Funding available for implementing SWAP objectives

Participants

Participants were recruited through a combination of purposive and snowball sampling. Key informants were identified, interviewed when possible, and subsequently asked for recommendations for additional interviewees. Altogether, we conducted 19 interviews with 22 wildlife conservation professionals in the U.S. Southeast. Interviewees had a variety of current and past roles, including with federal agencies (U.S. Fish and Wildlife Service, United States Geological Survey; n=3), state agencies (Virginia, Florida, Georgia, Tennessee, North Carolina, West Virginia, Louisiana; n=11), a tribal nation (Eastern Band of Cherokee Indians; n=2), regional quasi-governmental (Southeast Conservation Adaptation Strategy; n=3), and nongovernmental organizations (Defenders of Wildlife and The Nature Conservancy; n=5). Two interviewees had experience working with multiple organizations, resulting in an affiliation count (n=24) greater than the number of interviewees (n=22).

Semi-Structured Interview Procedure

The Virginia Tech Institutional Review Board (Protocol # 20-540) approved the study protocol, interview questions, and recruitment materials. All interviews were conducted virtually and recorded over Zoom (Zoom Video Communications Inc., 2024). Written consent to conduct and record interviews was obtained ahead of time and re-affirmed verbally at the time of interviews.

Each interview followed the same general script (Appendix A), although the semi-structured approach allowed for variations in the order of questions and for interview-specific follow-up questions. Interview questions focused on participants' experiences with SWAPs and wildlife action planning in general; how climate change information is used and incorporated into SWAPs and wildlife planning and management; and their experiences and knowledge of their organizations' collaborations with other entities. Interviews were recorded and transcribed by the lead author.

Analysis

Transcripts were qualitatively coded using Nvivo software (Version 14). A thematic content analysis approach was used, starting with the creation of inductive codes to limit the impact of prior expectations or biases on data analysis (Castleberry & Nolan, 2018; Vaismoradi et al., 2016). These codes were categorized into more general themes, which were combined again to establish an even more general level of themes. These three levels of codes and their definitions were used by the lead author to compile a codebook after two rounds of coding (Williams & Moser, 2019). The codebook and code definitions were discussed, adjusted if necessary, and eventually agreed on by coauthors. The lead author then performed a third round of coding to confirm the final codebook and assignment of codes to segments of each transcript. For consistency, a co-author randomly selected three transcripts to code using the same codebook. These codes were compared to the lead author's coding for the same transcripts to establish inter-coder reliability through discussion and agreement (Campbell et al., 2013). Discrepancies in codes used were addressed by both authors and resolved with little to no difficulty, supporting validity of the coding system and process. The complete codebook is available as an appendix (Appendix B), but limitations in space prevent us from discussing each

code and its use. Included below in Table 2-2 is an annotated codebook outlining the codes we focused most on in this study.

Table 2-2: Selected qualitative codes

THEME	DESCRIPTION	SAMPLE QUOTE
Adaptation	Adjusting to meet changing demands of current threats and needs	*"So there's that on one end of the spectrum and then you're even if someone is fully bought in, I think there's still a fear of of creating novel ecosystems, that that's not the right thing we should be doing. We should be creating resilience. And I don't think it was how they might say it, but reading between the lines and myself listening to some of these conversations and it feels like there's, there's folks that are bought in on, on climate change that they they're game for enhancing resilience, but they don't feel confident that we know what to do, that we should be doing more of these riskier strategies that are directly changing an ecosystem"*
Capacity	Available manpower and time relative to conservation work demand	*"So I think, you know, capacity is also a huge problem. Most, for, for one thing, most states have way more species of greatest conservation need than they have personnel to manage and protect them."*
Climate information	Data on climate change and its impacts	*"I think on the one hand there's so there's a lot of climate change information out there. And there's a lot of different tools. There's the, there's the climate adaptation science centers have lots of information."*
Collaboration barriers	Obstacles to working together effectively	*"I'm hoping that I can leverage all of these potential collaborators and future collaborators in a fairly efficient way that doesn't lead to bogging down my or Jeff's schedule, keeping us from giving our own internal non-game staff members what they need, being able to respond to their questions in a timely manner. I can see where that would be a major issue."*
Collaboration drivers	Things that make working together more desirable or effective	*"It's something that I try to think about frequently is just when are you the not the right person for a task? And I think it's in that situation, realizing the limitations of maybe our backgrounds and mindsets. Understanding we can't accomplish some things without that type of engagement and partnership."*
Collaboration-tribal perspectives	Tribal representatives' interpretation of working with other entities	*"So we integrate on a lot of projects, especially with conservation issues related to if there's an at-risk species. We try to work with the state and it's usually pretty good."*
Funding	Financial resources for conservation work	*"So engagement, when you come to the table with funding always, always helps. That's nothing new. I'm not saying anything there that nobody else knows, but it really does help."*
Habitat shifts	Geographic alterations in habitat suitability	*"Now with climate change, we recognize that spec…, that communities are shifting and moving. And so that oak site or that pine site might change. What is it changing too? And does that*

		seem to be something that would be good or bad for overall biodiversity?"
Interdisciplinarity	Collaboration from individuals/agencies from a variety of fields	*"I've been involved with work where it's a lot of the same type of wildlife biologists in the room. And we have a very specific way of thinking about the issue. And then you pull in our human dimensions people or someone who has more of a legal background. And you start to see the picture a little bit better."*
Managing for change	Addressing rapidly shifting ecosystems, threats, etc. into conservation planning efforts	*"I'd say that that's at least one of the future guidances too for revisions, but something we're already in the process of talking about of what managing for change might look like for this state and what situations to consider that in."*
Regional entities	Groups comprised of members located across states	*"Any way that we can take on the work of helping states share what they're already doing. I think that's really important for regional organizations that are already in existence and should be doing that anyway to do, yeah. That's the best way to remove some of those barriers."*
Relationships	Connections between people that can influence how they work together	*"You can't just show up on the doorstep and say, "hey, do you want to play?" Those relationships, take time to develop"*
Representation/participation	Inclusion of a variety of partners with different demographics, expertise, job responsibilities, etc.	*"So really just trying to, trying to have that baseline comfort level to attract the, the diversity of participation that you need to really make it effective."*
Resilience	Ability of a system to maintain its current state and conditions	*"Mostly in the resilience because it's easiest to understand and there's, you know, we all know what the good things are to do to maintain resilience regardless of climate change, right? So to know that you need to do more of that or it's more important, is easier to plan for."*
Tribal process	How tribes develop and implement plans and engage collaborators	*"They said we really like how the tribes has this process of re-evaluating and it's really adaptive processes."*
Use of information	Taking data and utilizing it to inform practices, plans, etc.	*"But I think our challenge now is, I think we have enough information to act, and I think many agree that we've gathered enough information to start taking action where we can."*
Working across boundaries	Collaborating with entities separated by various social, political, practical, etc. boundaries	*"I think the conversations still occur regardless of that state boundary and occasionally trying to pull the correct partners from across those borders."*

Preliminary results were also presented to a SWAP Advisory Committee composed of wildlife conservation and planning professionals from the SEAFWA states multiple times throughout the coding process. The Committee members were able to confirm that these preliminary results were on track with what they were witnessing and experiencing working in the field.

Results

In examining whether ideas from collaborative governance could be helpful in managing species as climate change and other challenges become more acute, we organized our semi-structured interview results into four sections. First, before explicitly discussing collaboration, we summarize our findings around the current challenges faced around biodiversity conservation. Next, we discuss collaboration among different stakeholders. Third, we discuss collaboration across jurisdictional boundaries. Lastly, we summarize our findings around the growing need for enhanced collaborative governance arrangements, as expressed by interviewees.

Current challenges to biodiversity conservation

Greater collaboration in biodiversity conservation is both necessitated and inhibited by the broader challenges to biodiversity conservation in the Southeastern United States identified by interviewees, such as acute disease, invasive species, and climate change impacts. One overarching barrier to biodiversity conservation identified is the difficulty of deciding to respond to these challenges and manage from a lens of resilience, adaptation, or transformation. Interviewees reported that conservation efforts that are more open to major change generally involve more risk and uncertainty, with one interviewee observing that:

> It feels like there's, there's folks that are bought in on, on climate change, that they they're game for enhancing resilience, but they don't feel confident that we know what to do, that we should be doing more of these riskier strategies that are directly changing an ecosystem. (Participant 5)

Additionally, according to our interviewees, issues with information influence decisions on how to respond to threats. In some instances, such as with climate change models and information,

many conservation professionals interviewed said that the challenge is an inability to utilize and interpret existing data and models rather than a lack of information. Several interviewees attributed this weakness to the sheer volume of data and others pointed to a lack of expertise in translating climate models to practice. One interviewee in describing interactions where SWAP coordinators from multiple Southeast states had shared perspectives, said that the main challenges respondents were facing regarding incorporating climate change into their SWAPs:

> Seemed to be those two things primarily- that there was just such a limited capacity and so much information. And given the limited capacity, state staff were just feeling very overwhelmed with what to use, how best to use it, what tool or data best fit their needs. (Participant 3)

On a related note, interviewees also mentioned capacity limitations in addressing climate change, collecting ecological and other types of data, managing species, and establishing collaborations. Both human capacity and funding are almost always disproportionate to what is needed, often due to either the complexity of issues like climate change or the demanding nature of work like protecting long lists of SGCN.

Multi-stakeholder collaborative governance

We explored whether multistakeholder collaborative governance is beneficial in addressing the biodiversity conservation issues outlined above and could be increasingly so in the future. We discovered many ways in which it strengthens biodiversity conservation actions and planning. Many interviewees talked about the importance of involving people from a variety of disciplinary backgrounds and positions, including private landowners, nongovernmental organizations, and state agencies. They said that such inclusivity allows for a wide range of views, needs, and expertise, making conservation projects more effective for both biodiversity

and people. Additionally, organizations like NGOs are often more nimble and quicker to respond than government agencies, so these collaborations can make conservation efforts more adaptive to changing needs and conditions. Specifically related to collaboration in the SWAP process, one interviewee told us:

> It's buy-in, it's getting more work done on the ground. It's the ripple effect. It increases information, education and involvement and engagement in it. … It's not just a state plan. It is for all the people in the state and it is for all those partners. So the benefits are just immense. (Participant 16)

As far as challenges to collaboration, interviewees noted political barriers impacting how professionals can speak about and address issues with stakeholders, most often in connection with climate change threats. Interviewees also identified a need to be sensitive depending on their state administration's stance on the issue, trying:

> To walk that line of being a natural resource agency, … how we talk about climate change. And so it's a factor, I don't know if it's a limiting factor, but it's important for us to walk that line appropriately and stay within our bounds. (Participant 20)

Conflict at the institutional and individual levels can also complicate effective collaboration, with "personality more than anything in the organizations" (Participant 11) determining the success of collaborations. Even in the absence of conflict, successful collaborations generally require trust and established relationships. Additionally, interviewees from some states also spoke about limited engagement of stakeholders like private landowners and industry members, who play a major role in landscape management decision making, and a desire to better incorporate them in the future. One interviewee spoke about the challenges of involving private landowners and noted that:

> The limitation in all of that is finding a way to include private landowners … the private managed forests in the southeast, which comprise a huge number of acres, are, are tremendously important and will be tremendously important in implementing these plans. So, you know how to get them at the table to start with, is really, is really difficult. (Participant 1)

Engagement of and collaboration with tribes was another major theme in our interviews because of the unique benefits, challenges, and recent developments in their involvement in the SWAP process and wildlife planning more generally. From the perspective of our Eastern Band of Cherokee Indians (EBCI) interviewees, increasing federal recognition of tribes has drastically increased demand for their input on conservation work because it means agencies are required to consult with them before moving forward. While tribes, agencies, and other interviewees all spoke overwhelmingly in favor of these collaborations and expressed desire for involvement beyond what is mandated, clear practical challenges emerged. One EBCI representative outlined some of the challenges to these collaborations, saying:

> When people do want a project in our region, they contact us or they contact somebody else, right? And access can be a little difficult because maybe like an IRB that we have to do or we have our own. Or could be because we have to figure out who owns the land and that's really hard to figure out, believe it or not, even for us. (Participant 21)

Interviewees also discussed limitations to other collaborators' resources for effectively and appropriately engaging with tribes, which they reported to be very time intensive and unclear.

Transboundary collaboration

We also looked at collaborations across geographic boundaries- namely state borders. Interviewees emphasized effective management of threatened species as their geographic

habitats shift as a benefit of collaborating across state lines "so they start putting things a little bit more on a different time horizon of sharing stewardship with their neighboring states because that stewardship may shift" (Participant 3). Because state boundaries are ecologically arbitrary, many neighboring states share both species and environmental threats. This represents an opportunity for state agencies and other actors to benefit from shared information and resources, given a mindset of "my partner, my neighbors were dealing with the same things I am. We can be neighbors, and we can be partners. Let's deal with that." (Participant 9). Additionally, cross-state collaborations specifically increase available funding because these projects are eligible for Competitive State Wildlife Grants.

When speaking about what currently works well in cross-boundary collaborative governance, regional entities were also repeatedly mentioned, given their important role in facilitating; "the directors you know at the senior levels, the directors and deputy directors … communicating about some of these cross state, multi-state, cross-state issues pretty regularly" (Participant 2). Many interviewees pointed to their importance in facilitating conservation work over a larger area and across jurisdictional boundaries like state and tribal nation lines. They noted groups like the Northern Institute of Applied Climate Science (NIACS), the regional Climate Adaptation Science Centers (CASCs), and the regional Associations of Fish and Wildlife Agencies (AFWAs) as critical to addressing a variety of issues, including disseminating regional information, managing shifting habitats, and driving more adaptive and flexible management. The CASCs in particular were considered "a valuable resource for data and information and anything climate change" (Participant 20). According to our interviewees, the roles these regional entities play are even more essential during times when federal and more large-scale agencies experienced increased political and funding challenges.

Several interviewees also recognized the Southeast Conservation Adaptation Strategy (SECAS) for their Blueprint software as a tool for facilitating future collaborative efforts both within and across states. The Blueprint identifies geographic points of connectivity in the landscape, thus helping states and other entities find opportunities to work across borders on information sharing, resource pooling, and climate change planning. As one interviewee put it, "I have to plug the SECAS Southeast Conservation Blueprint, you know, as kind of a broad tool to help identify and really put together those areas of high conservation value on the landscape that are important to achieve". (Participant 1)

Future need for collaborative governance

Every interviewee emphasized that the benefits of collaboration far outweigh the challenges. They also overwhelmingly expressed a desire to strengthen and grow the infrastructure for collaborative governance in SWAP revision processes, climate change work, species management, and habitat work writ large. However, current collaborative governance mechanisms may, however, be insufficient to deal with growing and changing threats. Specifically, when it comes to cross-state collaborations, often resulting from regional or outside entities' efforts, interviewees shared success stories but simultaneously expressed the need for a significant increase in these partnerships. From a management perspective, interviewees frequently noted habitat changes and species' range shifts are worsening, ecologically and socio-politically complicated, and necessary to plan for. These issues are only exacerbated when the impacts stretching across jurisdictional boundaries like state lines. One interviewee's organization works to help prepare for these coming changes, stating:

> So one of the things that we're working with states to do is to think about this regional lens as just kinda like, well as species ranges shift, are they going to shift out of your

> state, can you say goodbye to it? … But also how can you be a good neighbor and cross collaborate and have a mutually beneficial relationship? (Participant 9)

More specific challenges include general uncertainty around what happens to state-level protections for threatened and vulnerable species as they shift into neighboring states where they are not currently identified as at risk. This dynamic is particularly complicated when shifting species threaten pre-existing ones in their new habitats, for instance by introducing new diseases and competing with native species for resources. Even differences such as institutional operating procedures across boundaries could make consistency difficult and limit cross-boundary work. Interviewees highlighted a pressing need to develop stronger plans and systems for these situations and improve collaborations across jurisdictional boundaries.

Discussion

This study examined Southeastern United States biodiversity conservation actors' preparedness for global change impacts, especially species' ranges shifting because of factors like climate change, and how collaborative governance can support these efforts. To do so, we used the State Wildlife Action Plan (SWAP) update process as an example to examine the present state of multistakeholder and cross-boundary collaborative governance, as well as potential benefits and strategies for strengthening collaborations in the future. Agency officials and other actors are often reticent to adopt innovative but potentially riskier approaches to biodiversity conservation, especially if they feel that they could be left holding the bag if they do not work out. Collaboration can be a way to share the risks, enhance confidence, and mitigate opposition to novel new approaches.

The timing of these interviews was significant because most states were in the process of preparing their SWAP updates due in 2025. Because SWAPs identify priorities and partnerships

for the next subsequent years, our interviewees were able to speak to relevant goals and challenges of their organization as they look to the future. One of the main overarching implications of our results was the broad agreement that biodiversity threats like climate change will almost certainly worsen in the coming years, leading to more drastic ecological changes (Abbass et al., 2022; Lawrence et al., 2020). Exploring biodiversity conservation planning for these impacts now will allow entities to be proactive in addressing resulting ecological and social challenges in concert with the full suite of stakeholders impacted by and that have influence in decision-making (Januchowski-Hartley et al., 2022).

Predictions around species shifting also underscore the importance of considering barriers to and how to improve cross-boundary collaborations. Collaborative governance research consistently shows that institutional support and resources can have a major impact on the success of cross-boundary collaborations (Aldworth & Schultz, 2023; Tait & Brunson, 2021). In our study area, regional entities like SEAFWA, SECAS, and the Southeast Climate Adaptation Science Center (SECASC) fill this role by helping share information and resources, as well as identifying target areas for conservation projects within and across boundaries like state and tribal nation lines. They also facilitate collaborative governance approaches by providing community and forums for partnerships to develop through events like meetings and symposiums, which give people from a variety of positions and disciplines opportunities to form relationships and build trust on an individual level. One key theme from in this research is that relationships matter and thus personalities can foster and hinder collaboration. Our interviewees also stressed that—especially because they are rooted in interpersonal relationships—true collaborations and partnerships take time to develop, so patience is needed. This need and the importance of trust are consistent with research in a wide variety of fields, including

collaborative governance (Alshwayat et al., 2021; Bond-Bernard et al., 2018; Coleman & Stern, 2018).

In our research, these themes emerged as particularly important when engaging with tribes. After speaking with both members of the EBCI and individuals who had worked with various tribes, we learned that engaging tribes can be very challenging to navigate as the processes are unique and contact persons are not always clearly identifiable. However, following and respecting those processes is integral to forming successful partnerships. Several of our interviewees pointed to how individual relationships—often formed in settings like regional meetings—can add clarity to the process and build trust. Capacity is also often a major issue for tribes, especially ones who have recently gained federal recognition because that drastically increases the number of entities mandated to consult them on projects. These challenges, however, do not mean that tribal engagement should be skipped or avoided. Both tribal representatives and other interviewees pointed to tribal involvement as essential, both ethically and to improve the quality of conservation programs. These collaborations should be approached with as much patience and flexibility around timelines and levels of engagement as possible.

Patience is also greatly needed in collaborations where personality issues and other conflicts emerge, which is not uncommon. Social dynamics can be extremely challenging to navigate, but several interviewees mentioned strong, neutral facilitation as a tool for managing perceived power dynamics and the emotional components of disagreements. Examples of potential neutral facilitators were NGO staff or representatives of regional entities. Of course, resources and time may be limiting factors in involving third-party facilitators and more straightforward collaborations may not require it. Interestingly, while other research supports the role of facilitators in collaboration, there is a divide on the degree of neutrality required versus

power exerted to ensure success (Westin & Montgomerie, 2024). Optimal approaches likely depend on many factors such the issue at hand, the individuals involved, and goals for the collaboration.

Even though effective collaboration in conservation work is not novel in this geographic region, there is much room for growth, especially as threats shift, increase, and necessitate broader engagement. While interviewees from some states such as West Virginia reported spending a lot of time and effort in cultivating relationships with private landowners, most our interviewees spoke of a major need to identify ways to more effectively engage them and to prioritize doing so, both in general and more specifically regarding SWAPs. Similarly, stronger engagement of industry members, whether natural resource providers or other businesses, seems to be important in making collaborative governance more holistic and to avoid power imbalances among players (Ansell & Gash, 2008). Several interviewees described shortcomings in this area and uncertainty around how to go about engaging these stakeholders, but also pointed to them as important players with whom to build relationships in order to make conservation interventions as effective as possible. A growing body of research aligns with this description of collaborations with private landowners and industry members as needed but lacking and outlines possible steps to doing so, such as working to understand priorities and needs (Burger et al., 2019; Drescher & Brenner, 2018). Participation in collaborative governance can also play an important role in motivating stakeholders to engage in land and wildlife conservation efforts (Graves, 2018), further underscoring the importance of these relationships.

Despite the challenges, most interviewees reported that, in their experience, the pros of collaboration far outweigh the cons. Collaborative governance can enhance shared capacities, not least by pooling resources (Emerson & Gerlack, 2014) and bringing new actors to the table with

the necessary expertise (Innes & Booher, 2018). According to our interviewees in particular, benefits like funding from C-SWGs, which are exclusively given to multi-state projects and shared information are worth dealing with increased timelines, interpersonal issues, and other challenges that accompany collaborations. Importantly, most interviewees expressed desire to see those collaborations expanded, which will be critical when confronted with species' habitat shifts, especially across boundaries (Mufungizi et al., 2023). Interviewees' responses also indicated openness to the facilitation of those collaborations, meaning acceptance of external guidance and facilitation is likely.

One major opportunity for utilizing collaborative governance theory in both SWAPs and more generally that emerged during our interviews is usability of climate information (Jebeile & Roussos, 2023). Multiple interviewees spoke of struggling with both too much information and lack of expertise in interpreting it. Regional entities like the NIACS, CASCs, and AFWAs were again mentioned and praised as invaluable resources in managing this challenge. They represent an avenue for strengthening collaborations between climate scientists and various practitioners, elevating the role played by the former and thus helping facilitate interpretation and use of climate information.

Our hope for the guidance provided here is that highlighting the importance of strengthening collaborations will increase the adaptive capacity of organizations, both in the Southeastern United States and more broadly. Embracing adaptation and transformation comes with risk and uncertainty (Armsworth et al., 2015; Barr et al., 2021), but most of our interviewees agreed that biodiversity conservation will have to shift to be effective. Collaboration can be a way to share the risks, enhance confidence, and mitigate opposition to novel new approaches. There are ways in which these shifts are already taking place. For

instance, many states are incorporating plants into their lists of SGCN, which was not historically the case. Several interviewees expressed desire to see further changes with SGCN lists, namely prioritizing species more realistically to focus on ones with potential for conservation. Collaboration and usable information hold promise for facilitating such changes and interviewees' support for both will hopefully guide biodiversity conservation in the face of impending threats. Indeed, some states have already worked to include cross-boundary collaboration in their SWAPs. South Carolina, for instance has chapters addressing the importance of embracing regional, national, and international collaboration for conservation of many of the state's wildlife species.

Conclusion

As climate change and other major global shifts persist and worsen, conservation professionals, particularly those in areas recognized as critical for future species protection, need to be as prepared as possible to deal with evolving threats. Semi-structured interviews with such professionals in the United States Southeast revealed that agencies and other entities are aware of this need but face many barriers to successful biodiversity conservation such as funding limitations, lack of expertise in data analysis and translation, and uncertainty around trying new approaches. Openness to adaptation and cross-boundary collaborations offer a solution to many of these barriers and can also lead to better conservation outcomes, although embracing them is not always straightforward. Given that the deadline for the next round of SWAP updates is fast approaching, this project allowed insights into whether and how these tools are being considered and what will be needed to adopt them successfully. Since threats like climate change are only expected to worsen, collaborative governance and adaptive mindsets have the potential to make a major difference in biodiversity conservation. Currently, regional entities in particular play a

significant role in driving these collaborations and facilitate much cross-agency work. However, conservation in the Southeastern United States and implementation of SWAPs would benefit from a more holistic collaborative governance approach involving stronger connections to stakeholder groups like climate scientists, private landowners, and industry members, as well as across state and tribal nation lines.

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Appendices

Appendix A: Chapter 2 interview script

Hi, my name is _____. I am a _____ (role) working on the NSF-funded *Scrambled Responsibilities* research project. We are interested in learning about your (organization, agency, tribe, etc.)'s roles in wildlife conservation, how your organization adapts to new information or changes, particularly with regard to the State Wildlife Action Plan revision process, and how your (organization, agency, tribe, etc.) collaborates with other groups. We will also ask several questions about your perceptions of how your work incorporates climate change factors and what may help you to do so more effectively in the future.

The interview is expected to take about an hour of your time. Do you have any questions before we begin? *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Tech.*

Before we proceed, I would also like to confirm: You did compete the IRB consent process, correct? As per the Information Sheet you reviewed, you may withdraw from this interview at any point without adverse consequences.

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

Background

Can you tell me about your role vis à vis the SWAP process (and/or wildlife action planning writ large)?

SWAP Revision Process

Does your organization update your SWAP intermittently between major updates? What motivates changes to the SWAP mid-cycle? What limits updating?

Can you think of a time when a new variable or dimension, such as the inclusion of plants, was introduced into the SWAP process during a major update? What motivated that addition? How did you handle it both procedurally and technically?

Can you think of a time when a variable might have been added but was not? What inhibited that addition?

SWAP Implementation

How does your state's SWAP influence the day-to-day management of and decision-making around species of greatest conservation need?

How does day-to-day management deviate from the SWAP? What factors might account for these deviations?

Agency Collaborations

State agency officials: How does your agency consult and/or collaborate with other groups (NGOs, tribes, etc.) in the development and implementation of SWAPs? What is the typical genesis of such collaborations?

Agency officials: What are the pros and cons of working with external partners?

In what ways might enhanced collaboration improve your work? Are there any barriers to better collaboration? Drawbacks to better collaboration?

NGOs, tribes, and other partners: Does your organization engage with state agencies as they develop their SWAP(s)? If so, in what ways? What factors facilitate and/or impede engagement?

What kinds of support would help you to better collaborate?

Climate Factors

Is responding to or addressing climate change a factor in your wildlife action planning work? How is it integrated procedurally?

What is inhibiting further integration of climate change into your planning?

What information do you use to understand climate impacts? Where does that information come from?

What (if any) knowledge gaps exist around the impacts of climate change? Are there particular data products that would be most useful and why?

Do you expect climate change impacts to shift or increase over time? Why?

Do you have any suggestions on people it would be valuable for us to interview on these topics?

Conclusion

That's all I have for the interview questions. Is there anything you would like to add? Thank you very much for your participation in our study.

Appendix B: Chapter 2 complete codebook

THEME	**DESCRIPTION**	
Subcategory	*Description*	*Sample Quote*
Barriers	Factors that interfere with or limit effective wildlife action planning and collaboration	
Lack of information	Insufficient data on species, habitats, threats, etc.	*"So I think there is always a desire to gain more action or to gain more information before acting. So there's always going to be identified data gaps. And I think every time we work on climate change or are doing projects as explicitly climate change based, we try to identify what those gaps are"*
• Uncertainty	• Lack of information around future conditions, threats, etc.	*"We can, we can create scenarios about that kind of thing possibly happening. But at the end of the day, you don't know if it will or won't, right? So, you know, it is it it, it's hard to plan."*
Political barriers	Political structures or processes that interfere with conservation work	*"We recognize that there are, there are political barriers, frankly in some states to really talking about climate change."*
Risk	Potential for negative consequences	*"But knowing what needs to be done differently or how, how a system how an ecosystem might need to be directed into a new state, like that's, that's pretty radical and it's also risky and challenging and hard to figure out."*
Change		
Change in administration	Shifts in political management of conservation practices and resources	*"Because also, and this happens everywhere, once that planning exercise is finished, within a couple of years, staff change, changes over, leadership changes over, how different programs choose to implement and incorporate in their project planning, that sort of changes over."*
Managing for change	Addressing rapidly shifting ecosystems, threats, etc. into conservation planning efforts	*"I'd say that that's at least one of the future guidances too for revisions, but something we're already in the process of talking about of what managing for change might look like for this state and what situations to consider that in."*
Resilience	Ability of a system to maintain its current state and conditions	*"Mostly in the resilience because it's easiest to understand and there's, you know, we all know what the good*

		things are to do to maintain resilience regardless of climate change, right? So to know that you need to do more of that or it's more important, is easier to plan for."
Transformation	Large scale, drastic habitat shifts in response to changing conditions and threats	*"And the question being, do we just kind of allow that to be an invasives dominated, poor, poor ecosystem condition, grassland or do we actually start to direct that transformation, that ecological transformation into a more functional grassland?"*
Characteristics of planning process/products		
Consistency	Similarities across plans, policies, and conservation actions, etc.	*"I just assumed that there was a method to selecting species of greatest conservation need that they all followed, and that has not been true. So they've been working really hard this year to get a more, a recommendation for a standardized way to select their species of greatest conservation need, which I think is huge."*
Integrative	Embedding themes, threats, needs, etc. throughout plans such as SWAPs	*"And so we're hoping to, again model things after Florida and try to integrate climate change into each chapter rather than have it as a standalone chapter because somebody made the point, like, if a person wants information on climate science, they're probably not coming to our department because that's not what we do."*
Interdisciplinarity	Collaboration from individuals/agencies from a variety of fields	*"I've been involved with work where it's a lot of the same type of wildlife biologists in the room. And we have a very specific way of thinking about the issue. And then you pull in our human dimensions people or someone who has more of a legal background. And you start to see the picture a little bit better."*
Representation/participation	Inclusion of a variety of partners with different demographics, expertise, job responsibilities, etc.	*"So really just trying to, trying to have that baseline comfort level to attract the, the diversity of participation that you need to really make it effective."*
Specificity	The level of detail contained in plans and models	*"Then thinking about more specificity. So every iteration of our plan has been more detailed than the previous in terms of the discussion about threats and*

		especially the actionable conservation actions that have been identified."
Usability	Whether information can be effectively utilized	*"So most of our changes have been to improve the functionality and the readability, and the usefulness, and the scale of the plan, getting it to where it needs to be, that takes a long time to get there."*
Climate		
Addressing climate change	Efforts to mitigate climate change impacts on habitats, species, people, etc.	*"It's certainly looking at how we're managing currently for those things and whether or not those actions are still climate smart moving forward."*
• Climate change plans and planning	• Organized efforts and documents addressing climate change impacts	*"We have gone now from talking about climate change as something we should be preparing for to actually trying to do so and even getting to the point where we are evaluating successes and failures in adaptation."*
Climate change	Long terms shifts in temperature, precipitation, etc.	*"Looking at the synergies between climate change and other existing non climate threats. Invasive species challenges already in climate change. On top of that, you know the challenges of how climate change intersects with other non-climate stressors."*
Climate change barriers	Obstacles to addressing climate change and its impacts	*"And then there's just, it is such a complicated topic and you could have an entire army of conservation that's just working on climate change in any state."*
• Far off impacts	• Long term consequences of climate change	*"The other thing is the fact that most people will say, and I've heard it many times, well, we can't do anything for it. That's 50 years from now that's going to happen."*
• Voluntary nature	• Climate change not being a required element in SWAPs	*"And that's again, that's why those that that guidance has to be voluntary. Climate change is not a required element under the law."*
Climate change impacts	Consequences of precipitation and temperature changes etc.	*"Some of the impacts that we have going on right now for just for example are increased temperatures, sea level rise has been a foot over the last 80 years"*
• Climate refugees	• Populations of humans and other species relocating due to climate change impacts	*"So we do think about them as well, but more through the maintenance lens and making sure that even in a future climate that we have refugia where they can*

		continue to be in. Seeing if there's a helping hand that can be given to maintaining through active management."
• Habitat shifts	• Geographic alterations in habitat suitability	*"Now with climate change, we recognize that spec…, that communities are shifting and moving. And so that oak site or that pine site might change. What is it changing too? And does that seem to be something that would be good or bad for overall biodiversity?"*
• Precipitation changes	• Shifts in rainfall patterns	*"Wet areas getting wet or dry areas getting drier."*
• Sea level rise	• Increased ocean levels in coastal areas	*"Then climate change is all in there with looking at sea level rise and we want to pull in some drought information because a lot of the RSGCN in the Southeast are aquatic species. So looking at things like connectivity of the wet river stream aquatic systems and looking at maybe working with the southeast CASC on drought probabilities and where that may impact species across the Southeast."*
• Temperature changes	• Changes in heat patterns	*"I mean, I didn't grow up here. But from what I understand, local folks talk about there being less winter. You know, less snow. Kids or people remember playing in snow more and they're not doing that anymore."*
Climate change in SWAPs	Incorporation of climate change and its impacts into State Wildlife Action Plans	*"So that's the one thing I'm working on that I think could be very useful across the Southeast to pull in states. I think we would be utilizing that group for the integration of climate change and regional chapter if we had had something like that right now."*
• Climate change chapter	• Incorporation of climate change and its impacts into State Wildlife Action Plans in the form of a designated chapter	*"We're also going to be creating a chapter that's going to be in the Wildlife Action Plan this time around that focuses on climate change. It's going to give a broad overview of what we've already seen in terms of impacts of Virginia wildlife and recreation."*
Climate information	Data on climate change and its impacts	*"I think on the one hand there's so there's a lot of climate change information out there. And there's a lot of different tools. There's the, there's the climate adaptation*

		science centers have lots of information."
• Climate change vulnerability assessments	• A general term to describe analyses of the vulnerability of species, ecosystems, human communities or other entities to climate change impacts	*"Yeah, so there are several several climate change vulnerability indices. So we've used, we've used the CCVI one developed by NatureServ, climate change vulnerability index that one's called. We've used, to some extent we've used the SAVs framework."*
• Climate modeling	• Theoretical predictions on future climate progressions	*"But really what you're trying to do with the models is think about what's going to change at some future climate period as compared to what's been observed in the past and what that might mean for plants, animals, habitat, and how it may shift over time and how those interactions may change, right?"*
• NIACS	• Northern Institute of Applied Climate Sciences	*"I think that there's been a lot of really good, easy to interpret and useful information out there as far as kind of integrating predicted climate change onto our local geography through, through NIACS, through… I think we're lucky in this region because there has been so much research done."*
Climate resilience	Ability to persist in the face of climate change and its impacts	*"And then what are the species that are predicted to do, okay, in those changing conditions? Which ones are not predicted to do very well? And managing accordingly, not, not necessarily at the expense of a species group, but just to make sure that the forests that we have that are intact are going to be resilient towards the climatic pressures that they're gonna be facing."*
Collaboration		
Collaboration barriers	Obstacles to working together effectively	*"I'm hoping that I can leverage all of these potential collaborators and future collaborators in a fairly efficient way that doesn't lead to bogging down my or Jeff's schedule, keeping us from giving our own internal non-game staff members what they need, being able to respond to their questions in a timely manner. I can see where that would be a major issue."*

• Collaboration limitations	• Boundaries around what collaboration can accomplish and when it can be utilized	
• Conflict	• Tension and disagreement around conservation decisions	*"We have maybe different views of the importance of the federal government compared to the state role. Again, that's just a basic, little bit of an overarching philosophical difference. And there have been some, probably there have been some personal, personally contentious interactions between our groups."*
Collaboration benefits	Positive consequences to collaboration	*"The long-term effort of of getting to know people and working towards consensus. But in the end of the day, you end up with a better product and something that it isn't just one entity, one agency saying this is what they want moving forward with them."*
Collaboration cons	Negative consequences to collaboration	*"Of course, the cons, I think it's like any partnership process. It'll take a little longer. And sometimes you might have conflict that is not resolved. Or different perspectives or philosophies on how to do something or what something is. The more people you get in a room, the harder it is to get everybody to agree, right?"*
Collaboration drivers	Things that make working together more desirable or effective	*"It's something that I try to think about frequently is just when are you the not the right person for a task? And I think it's in that situation, realizing the limitations of maybe our backgrounds and mindsets. Understanding we can't accomplish some things without that type of engagement and partnership."*
• Effective facilitation	• Characteristics or actions of leaders that help foster collaboration	*"Sometimes just really strong neutral facilitation in those groups makes all the difference in getting something done."*
• Partner buy-in	• Collaborators' feelings of investment in the process and success of programs and initiatives	*"So we try to pull them in early as part of the core of it to get their buy-in and in the beginning, because if you don't get in the beginning, you're going to hear about it in the end. So it's also just good public policy practice."*
Collaboration examples	Instances of working together in conservation efforts	*"When 2015, when we put 2015 together, we kinda did that on our own with some volunteer assistance*

		from TNC, but in 2016, when we were looking at how we were going to do, host a stakeholder meeting, how we're gonna do the revisions. We made the right decision to actually put TNC on contract. They were they were involved in the writing of the 2015, but we really just basically had them assisting us because of similar interests."
Communication	How delivery of information and interactions impact reception of messaging	
Information sharing	Providing data for other entities to utilize	
Partnerships	Established collaborative relationships	
Relationships	Connections between people that can influence how they work together	*"You can't just show up on the doorstep and say, "hey, do you want to play?" Those relationships, take time to develop"*
• Personalities	• Characteristics of individuals that influence how they interact with others	*"I'm not, you know, it's just a case of the different groups. I mean, if you're not really anything, I think that would improve it other than it just personalities."*
• Trust	• Lasting belief in capacities and reliabilities of others	*"So those types of, I think, long-lasting partnerships were really initially built on trust and built on sincere relationship building at that ground level"*
Working across boundaries	Collaborating with entities separated by various social, political, practical, etc. boundaries	*"I think the conversations still occur regardless of that state boundary and occasionally trying to pull the correct partners from across those borders."*
• Collaboration-tribal perspectives	• Tribal representatives' interpretation of working with other entities	*"So we integrate on a lot of projects, especially with conservation issues related to if there's an at-risk species. We try to work with the state and it's usually pretty good."*
• Cross-state and regional collaborations	• Working with entities based in other state(s)	*"So we do have those. I would say that especially in the state fish and wildlife agencies, there are regional associations, there's a national association. So the directors you know at the senior levels, the directors and deputy directors are communicating about some of these cross state multi-state cross-state issues pretty regularly."*
• Intergovernmental collaboration	• Different government agencies working together	*"But, um, but yeah, a lot of again, just in short, a lot of, a lot of that*

		success and coordination really depends on that ground level relationship-building and just trying to continue to work through these, through these opportunities to build a higher level of government, government to government relationship as well."
• Outreach	• Community/public engagement	*"So in terms of how we, how we write the plan and how we get input, is always that kind of public outreach and comment period. And not just the comment and tell us what you think, it's also the development of it too."*
• Stakeholder meetings	• Opportunities for public commentary	*"So we have hosted 21 stakeholder meetings because we've got 21 CFA's. We sent out invitations. It's an open meeting. Anyone can attend. We typically don't do a press release. We do more personal invitations, but anyone is welcome to attend."*
• Workshops	• Meetings of professionals	*"So we did a lot of looking at threats and stressors and various, the various different drivers of those, including both climate and not. And so these were working in in-person workshops, in teams."*
• Tribal involvement	• Collaboration with tribal nations	*"We are starting to collaborate and reach out to tribes here in Virginia as a major component of the public comment period and just stakeholder engagement period. It's a big challenge because they're, Jeff probably mentioned this, they are being pulled from all angles."*
Conservation Actions		
Adaptation	Adjusting to meet changing demands of current threats and needs	*"So there's that on one end of the spectrum and then you're even if someone is fully bought in, I think there's still a fear of of creating novel ecosystems, that that's not the right thing we should be doing. We should be creating resilience. And I don't think it was how they might say it, but reading between the lines and myself listening to some of these conversations and it feels like there's, there's folks that are bought in on, on climate change that they they're game for enhancing resilience, but they don't feel confident that we know what to do, that we should be doing more*

		of these riskier strategies that are directly changing an ecosystem"
Areas of opportunity	Potential options for directing conservation efforts	*"Areas, greatest areas of opportunities is with our industrial landowners and state of West Virginia. And we're gonna be able to do that by just having more set down in conversations."*
Assisted migration	Initiatives for human-driven relocation of species at risk	*"It's a really interesting question because like I said, there's been a lot of discussion recently among the states, at least in the Northeast, about this idea of assisted migration. Obviously that that creates a huge legal issue."*
Corridors	Pathways for species to pass between different segments of habitat	*"And also that work involves a lot of things happening in the state, especially corridor work. And I think that's a huge managing for change aspect we talk about regularly in our work is making sure our species have the ability to move as necessary."*
Habitat management and restoration	Conservation efforts to reestablish, maintain or direct habitat characteristics to support species	*"Our chiefs, our wildlife and fishery chiefs, they could be a little bit more focused on restoration on the Wildlife Action Plan, on trying to see through that some of these actions that we identified as needing to happen are getting done."*
• Controlled burn	• Prescribed fires as to manage fire loads and available nutrients	*"He's done a lot of work to show how prescribed burn windows may shift. So instead of being at the times that they've traditionally been well given climate change going forward like those windows are they're going to shift and maybe they're going to shrink a little bit."*
Implementation	Putting conservation plans and policies into action	*"And I think it's it's improved from that to really be more of a guide and a more of a roadmap to how conservation needs to be implemented."*
Land purchase	Acquisition of a property	*"But we also have used that priority areas when purchasing lands and identifying areas of high priority conservation as something else we want to try to, try to make a little bit easier."*
Landscape conservation	Habitat and species protection work at a landscape scale	*"And I think now there's a lot more recognition that these plans can be valuable roadmaps and valuable guides, particularly if the landscape*

		scale kinds of approaches and the biologically relevant kinds of scales are really emphasized rather than just within our state and it stops at the state line."
Monitoring	Continuously assessing the state and success of species, ecosystems, initiatives, policies etc.	*"And the new frontier there I think is monitoring, evaluating, and understanding what actions are being taken, successes or lack thereof, and how we might be able to change those practices moving forward."*
Prioritization	Decisions around which issues, threats, species etc. to give precedence	*"And we'll say, we will present this back out and see if the states, come back and say, oh, that's great, but what about this is really important too, because it's hard to figure out some of the state's priorities."*
• Conservation easements	• Agreements between conservation organizations and private landowners to set aside sections of land for preservation in exchange for funds	*"We're we are now working on finding funding through the conservation funds. And we're actually going in and we're purchasing easements for conservation access to caves, forest, habitat."*
• Conservation Focal Areas/Conservation Opportunity Areas	• Geographic areas prioritized for conservation efforts	*"And so helping them maybe refine their, well those states that have them refine their conservation opportunity areas by looking more broadly than just inside their state lines."*
Entities		
Experts	Those with specialized knowledge or training with regard to specific species, habitats, methods, etc.	*"We're using boots on the ground knowledge. We've got stuff in there that's, that's field verified, that our biologists who are experts in there, both their fields in their respective areas are providing input to this process and then all the other team members too."*
Federal entities	Agencies and departments situated at the federal level	*"I'm on a federal climate change work group that federal agencies are talking together, but it's, it's really high level. It's there's no, let's work together to do this. We're just mostly keeping each other up-to-date on projects or efforts or initiatives that we think that other representatives would be interested in."*
Landowners/managers	People or entities in charge of operations on a designated section of land	*"I think though the limitation in all of that is finding a way to include private landowners. The private, the private landowner, the, the, the private managed forests in the*

		southeast, which comprise a huge number of acres, are, are tremendously important and will be tremendously important in implementing these plans."
• Industry	• Stakeholders operating at a corporate level to manage, extract, and sell natural resources	*"Another limitation is in the business community. How do you bring in the, the power companies to understand transitions to green and improvements to electric transmission and that kind of thing."*
• Landowner decision-making	• How those in charge of tracts of lands decide how to manage them	*"And end of the day, it's gonna be the decision of that land owner, right to make their management decisions. And that's true for private as well. So we can make influence, we can influence and make supporting documents, arguments sound like ground things into research and studies to say this is what we wanna do and this is why we want to do it."*
• Private landowners	• Nongovernmental entities or individuals who own segments of land	*"Again, 83% of Virginia is private land. We have to start working at the private land level."*
NGOs	Nongovernmental Organizations (e.g., The Nature Conservancy)	*"And so by working with an NGO, they may have ways of either they have cash on hand or they have volunteer hours or something, they are able to write off or something that can come up as match."*
Regional entities	Groups comprised of members located across states	*"Any way that we can take on the work of helping states share what they're already doing. I think that's really important for regional organizations that are already in existence and should be doing that anyway to do, yeah. That's the best way to remove some of those barriers."*
• AFWA	• Association of Fish and Wildlife Agencies (including regional orgs)	*"The Southeastern Association is really one of those common, one of those common forums or meeting venues and frameworks where I think states have a lot of comfort. And within the SEAFWA, the Southeastern Association, they they cater to the needs of the states and their needs are always put front-and-center."*
• CASC	• Climate Adaptation Science Center (including regional orgs)	*"But the CASCs have really come on. And in fact, I think that in the*

		second survey showed that that was probably where most of the folks got their data. That's where most of the SWAPs got their data from climate adaptation science centers."
• Landscape conservation cooperatives	• Public conservation planning agencies	"The LCC days, which are the landscape conservation cooperatives, kind of semi-independent conservation planning entities on the landscape."
• SECAS	• Southeast Conservation Adaptation Strategy	*"I mean SECAS was started by the SEAFWA states really as a response to, well, there's a lot of landscape conservation planning going on, but none of it's covering full states and we're organizational bodies that are, that are in need of this that you should think about."*
Scales of governance	Entities operating at various levels of administration	*"The other scale issue is- that we're struggling with is scales of governance where you have a lot of different competing scales, or competing governance issues. What's the right scale to provide the information for what's happening"*
States	About specific states	*"That's important really for states to maintain their own, their own autonomy and maintain their authority."*
• State boundaries	• Lines dividing states and segmenting state-level governance	*"And I think now there's a lot more recognition that these plans can be valuable roadmaps and valuable guides, particularly if the landscape scale kinds of approaches and the biologically relevant kinds of scales are really emphasized rather than just within our state and it stops at the state line."*
• State differences	• Dissimilarities in state needs, threats, processes, etc.	*"And you'll notice looking from state to state, they're [SWAPs] very, even though they have this similar guidance and requirements, they're very different."*
• State entities	• Agencies and other groups operating at a state level	*"If you're just looking for a quick kinda understanding of how state agencies operate, it is one of those things. I mean, we have to operate under politics, we have to operate under the culture that's currently available, you know around."*
Information		
Assessment	Overview of status and conditions	*"And they do they do fair amount assessment, but sometimes they get*

		stuck in that. They're just collecting data on projects, long-term data. And the assessment is kind of difficult to get to sometimes because you have to do the analysis, you have to have it reviewed if possible."
Collecting information	The process of gathering data to be used for various purposes	*"We don't we're still, we're still in the inventory phase for some. We're trying to figure out if they even occur on tribal lands. And if they do, where do they occur, what kind of habitat?"*
Ecological information	Biological data on species and habitats	*"There's a shortage of knowledge about things that I was mentioning earlier, like water-holding capacity and how that's been dramatically altered since colonialism."*
Evaluation	Examining what is working well in a process or plan and what is not	*"And gathering that information about our accomplishments so that we can periodically evaluate our efforts to address those needs is a role that we really need to find somebody to take on."*
Regional data	Information covering a range of multiple neighboring states	*"A lot of that information is regional data and they may have already incorporated it"*
• Regional chapter		*"And the regional chapters, we're hoping that as SECAS staff, we can be added capacity to the states. And that if we write it for them, that's one place where it'll all be consistent and formatted and using the same information in the same way to look at the same scale."*
Spatial mapping	Visual representations of landscape characteristics, threats, species, etc. used in conservation planning	*"I think there's in the future, there's some, some possible opportunity and need to look at those more spatially refined threats on our landscape for sure."*
Use of information	Taking data and utilizing it to inform practices, plans, etc.	*"But I think our challenge now is, I think we have enough information to act, and I think many agree that we've gathered enough information to start taking action where we can."*
Methods		
Forestry planning	Management plans for state and national forest processes and actions	*"So some, you know, scientifically created estimate of the scale, scope and the severity of climate change's impact on the forest and what that forest looks like under climate change scenarios. If you don't have that, all you have are these*

		generalities that you don't really know what to do with."
Modeling	Production of hypothetical future landscape and species characteristics	*"We may not, you know we've been back-and-forth or whether we need to update the models much or just move forward and hope to use some newer, like some matrix modeling or something like that going forward."*
RAD framework	Resist, adapt, direct ecosystem management approach to dealing with major changes	*"So the sort of resist, adapt direct framework I think, has gotten a lot more attention as, as ecological transformation becomes something that we are seeing in real time."*
Scenario planning/modeling	Hypothetical projections of future conditions, threats, needs, etc.	*"We've looked at various intervals of sea-level rise or different scenarios and tried to come up with plans and actions that can take place at those various intervals or under different scenarios."*
Policy		
Law enforcement	The process of ensuring regulations are complied with	*"Becky and I have talked about including law enforcement as a I don't know if she mentioned this at all, but including them as a strategy and leverage point for addressing some of the key threats that we're seeing across the state with regard to our SGCNs"*
RAWA	Recovering America's Wildlife Act	*"So the federal money is really important. That's why organizations like ours and several others have advocated for Recovering America's Wildlife."*
Regulations	Laws, rules, policies, etc. to be followed	*"And the federal agencies are mandated. They have certain things that they do have to invite the public to, and that's fine, that shouldn't be ignored. The National Forest Management Act and NEPA and those kind of guiding regulations."*
Resources		
Blueprint	SECAS software for mapping areas of opportunity for conservation actions	*"I think I have to have to plug the SECAS Southeast Conservation Blueprint, you know, as as kind of a a broad tool to help identify and really put together those areas of high conservation value on the landscape that are important to achieve."*
• Connectivity	• Geographic proximity of areas of opportunity	*"But we're providing connectivity across a landscape for species to move and disperse and we're*

		anchoring them with the hubs so they don't move too much and you don't put your efforts in a corridor are going to nowhere."
Capacity	Available manpower and time relative to conservation work demand	*"So I think, you know, capacity is also a huge problem. Most, for, for one thing, most states have way more species of greatest conservation need than they have personnel to manage and protect them."*
• Hiring	• Both a challenge and opportunity for entities to increase capacity	*"I think until there is a requirement, either a big regulatory requirement or big regulatory or big financial incentive for the states to bring on this capacity, they're not going to."*
Funding	Financial resources for conservation work	*"So engagement, when you come to the table with funding always, always helps. That's nothing new. I'm not saying anything there that nobody else knows, but it really does help."*
• State Wildlife Grants	• Funding sources for conservation projects at the state level	*"Of course, we use it when we are allocating state wildlife grant funds. So we have a grant process where partners will apply external and internal. And so it is it is often part of the criteria to reference the State Wildlife Action Plan."*
Species		
Endangered species	Federally listed species	*"For a lot of the endangered species, the populations are so restricted and so localized that you really can't model to that, to that level of precision."*
Game species	Species hunted for entertainment/sustenance	*"There is a, there remains I think a culture of you know, game species provide a lot of the funding and so game species got a lot of the attention."*
Plants	The process of incorporating plants into SWAPs and the reasons for doing so	*"Given now, especially if RAWA goes through and states get more money if they have plants on the list, I'm guessing a lot of states are putting, adding, adding plants."*
RSGCN	Regional Species of Greatest Conservation Need	*"When I think about like regional species of greatest conservation need, because they share so many of them like kinda like, like I said, like the majority of them are already shared by three or more states."*
SGCN	Species of Greatest Conservation Need	*"Most, for, for one thing, most states have way more species of*

		greatest conservation need than they have personnel to manage and protect them."
Species decline	Reduced size of populations or loss of species diversity	*"I think they're going to continue to see major change in population abundance, disease prevalence, carrying capacity on the landscape as a result of climate change."*
Species management	Actions undertaken to conserve species	*"So there's some definitely differences in the realm of how climate change is even affecting the conversation about what mitigation and/or management actions we could take to help some of these SGCN species."*
Species shifting	Geographic alterations in species' ranges	*"We've got high diversity. But a lot of species that a very small portion of Virginia is currently their home. But for a lot of those southern range species, much more of Virginia is becoming their home. How does that impact and influence how we tier and manage for those?"*
Wildlife	Animal species	*"So when we talk about climate change, we end up talking about a lot of things that we're already doing but with a climate change lens for wildlife at least."*
SWAPs	State Wildlife Action Plans	
Deviation from SWAPs	Conservation acts and plans that run counter to what is outlined in State Wildlife Action Plans	*"All of the conservation decisions typically come down to to local kinds of conditions. So there's always gonna be deviation from, from what those plans. They can only foresee out so far."*
Interest in SWAPs	Reasons entities want to contribute to the development and/or success of State Wildlife Action Plans	*"The State Wildlife Action Plans are of interest to Defenders because there are so many imperiled species that are not listed under the Endangered Species Act."*
Role in SWAPs	How entities contribute to the development and/or success of State Wildlife Action Plans	*"So this is my second SWAP. I also was involved in the 2015 and I led the habitat team there and for a brief period led the climate change team as well until it became obvious I couldn't really do both."*
SWAP advisory committee	Stakeholder groups submitting input on State Wildlife Action Plan development	*"So 2005, for the 2005 plan, we actually stood up an external stakeholder committee that was formed by representatives, representatives, major conservation players in Virginia."*

SWAP changes	Major or minor alterations to State Wildlife Action Plans (either during or outside of revision periods)	*"The incorporation of plants, for instance, not something that we had done in our prior plans other than talking about habitats."*
SWAP content	Species of Greatest Conservation Need, threats, key habitats, conservation actions etc. identified in State Wildlife Action Plans	*"And then some, some SWAPs just listed every action under the sun. And it's just like do everything to stop this multitude of threats."*
SWAP limitations	Restrictions and boundaries around the contents of State Wildlife Action Plans and what they can be used for	*"The SWAPs, they're restricted on how much, you know, at least how much the funding can be used for."*
SWAP process	How state agencies and their partners develop and update their State Wildlife Action Plans	*"I know through the development of SWAPs there, there's been multiple points of contact that have been reached out to in particular in the review process, making sure it was well vetted."*
• SWAP guidance	• Association of Fish and Wildlife Agency's recommendations for states on the structure, contents, and use of State Wildlife Action Plans	*"So that's one of the things that we really tried to do in this SWAP guidance was point people to the different tools that are available and talk about when this, when this might be helpful."*
Use of SWAPs	How State Wildlife Action Plans are utilized and the purpose they serve	*"But I think our goal is to try to promote the SWAP and get more people helping with implementation and in raising the profile of it and making it a little more accessible to other groups."*
Threats	Factors with the potential to negatively impact wildlife species and ecosystems	
Disease	Contagious illnesses	*"Or there's a disease that comes along. I mean, that's something else that popped up with all this, the climate change, is that increase in fungal diseases is potentially a problem"*
Habitat loss, change, and degradation	Ecosystem changes impacting habitability for species	*"If we are, you know, cutting down a whole bunch of forest habitat to build a solar farm. That's potentially an additional threat."*
Human impacts	Human actions with ecological impacts	*"That adds information to the development of understanding what our actions, the tribe's doing could positively or negatively affect groups of organisms or habitats"*
Illegal trade	Poaching and illegal sale of species	*"Our current plans don't speak at all to poaching and the illegal trade of turtles as a primary threat to those species. Our new plan will speak to that extensively."*

Invasive species	Nonnative species that take habitat and resources from native ones	*"But a lot of the big changes are connected to things like invasives, which are connected to transportation systems as much as anything, right? And where people are moving because they tend to be the ones that carry a lot of those invasives around"*
Wildfires	Unplanned fire events risking for humans and the environment	*"So we do see we do expect there to be more frequent flooding could be more droughts and more fires. In our area, fires are really concerning."*
Tribes		
Historical context	Past relationships between tribes and federal, state, and local agencies and how those influence current interactions	*"Every, every tribe has their unique historical context with which has just spread it. It's just littered with conflict often in terms of that historical relationship with the state."*
Indigenous knowledge	Data and information collected by and belonging to tribes	*"So the Eastern Band of Cherokee tribe down there has worked very closely with North Carolina and they co-sponsored a webinar series that talked about incorporating tribal knowledge or traditional ecological knowledge into state wildlife action plans."*
Tribal interest	How different approaches and plans can benefit tribes	*"Kinda as we evolved, we looked at these broader interests of what the tribe kinda had to do for some, in some ways based on endangered species, what we're interested in, in terms of game as well as non-game species that particularly had a cultural kind of keystone element to the tribe."*
Tribal land	Land federally designated for tribal use and management	*"So should the tribe buy more farmland, should they invest in other, other ways of revenue maybe outside of the tribal boundary? I don't know."*
Tribal organization	Tribal governance structures	"I see tribes as like a microcosm of the US. We have our same branches of government; we're smaller though. So it's a community that's closer knit."
• Sovereignty	• Tribes' independent government structures and control of tribal land management	*"But it wasn't very applied and working with the tribe is a great opportunity to apply these perspectives because it's a sovereign nation. We have our own independent governmental structure outside of the state."*

Tribal process	How tribes develop and implement plans and engage collaborators	*"They said we really like how the tribes has this process of re-evaluating and it's really adaptive processes."*
Tribal wildlife action plan	Tribal equivalent of a State Wildlife Action Plan (not federally mandated; voluntary)	*"But we're kind of looking at it though as a guide to, again, focus on these different buckets of priorities and then work with partners to get as much done as we can through that internal planning process."*
Tribal wildlife grants	Tribal equivalent of the State Wildlife Grants program	*"But when when the sister program to the SWG program was adopted, the tribal Wildlife Grants Program, the tribe, prior to me coming here, started looking for those monies to start to build up another more conservation-based program."*
Values		
Cultural importance	Reasons for conserving species, sections of habitat, resources, etc. that are related to value assigned by people	*"There's also some sort of internal surveys and projects we've been doing with other species that might have cultural interests."*
Economic importance	Reasons for conserving species, sections of habitat, resources, etc. that are related to monetary value	*"But from the wildlife specific projects, we have had some interests in elk and their economic benefit."*
Hunting and fishing	Harvesting of wildlife species for recreation and sustenance	*"Most state fish and wildlife agencies are funded primarily, but not exclusively with funds generated from the sale of hunting and fishing licenses."*

Chapter 3: Community engagement in ecotourism development in Sierra Leone

Abstract

Ecotourism offers opportunities for communities to concurrently enhance their economic wellbeing while conserving natural resources and protecting vulnerable species. Sierra Leone, a developing country in West Africa, does not have a well-established tourism sector but there are opportunities to increase demand, capitalizing on untapped natural and cultural resources. Various government agencies and nongovernmental organizations, led by Tacugama Chimpanzee Sanctuary, are seeking to develop a vibrant ecotourism sector. This study engaged key stakeholders, including community members in the areas surrounding existing and potential ecotourism sites, to better understand the benefits they are seeking, how they are being engaged, and the concerns they have. Findings include a desire among all groups for economic and infrastructure benefits, communication challenges between local communities and other stakeholders, and the importance of keeping ecotourism development in Sierra Leone manageable. This work has shown the importance of relationships with local communities, both to understand the intricacies of relevant social dynamics and to build trust around collaborations on ecotourism development. A more collaborative model of ecotourism development is ultimately recommended.

Introduction

Sierra Leone is a tropical country in West Africa with a population of roughly eight million people and an economy dominated by subsistence agriculture and mining (Sesay et al., 2023). The country's reputation suffered because of a protracted civil war that ran from 1991 to 2002 (Kaldor, 2006) and an Ebola epidemic in 2014 (Kongoley-MIH, 2015; Nyenswah et al., 2016; Shakya, 2009). However, Sierra Leone is now relatively stable, and constituencies are

calling for wildlife conservation and tourism development. Nascent efforts are underway to integrate these two objectives under the banner of *ecotourism*, providing economic benefits to communities that incentivize and resource conservation efforts. This paper examines initial efforts to establish ecotourism in Sierra Leone, identifying challenges and opportunities that are hindering and facilitating these initiatives.

Ecotourism and its benefits

Ecotourism is "travelling to comparatively less exploited natural settings to experience the natural environment, obtain knowledge about wildlife, and appreciate local cultures in authentic settings while preserving the environment of those destinations" (Dayour et al., 2024, pp. 1-2). Key goals include minimizing the negative and enhancing the positive impacts of tourism on both the natural environment and communities; fostering shared learning and respect; providing financial and other benefits for all stakeholders; and financing conservation efforts (Dayour et al., 2024).

Ecotourism projects are more likely to be successful if they provide local communities with positive impacts like economic benefits, infrastructure development, and employment (Cossengue et al., 2025; Stronza & Gordillo, 2008; Weaver, 2014). Additionally, adequate communication can help all parties come to agreement on what is planned, what can be expected, and what constitutes a successful tourism program (Bichler & Lösch, 2019; Mearns, 2015). However, many ecotourism programs do not successfully align targeted benefits with what communities report actually wanting, needing, and valuing (Tarino & Purnomo, 2024). There are also often discrepancies between benefits that are promised or expected and those that come to fruition (Warinda et al., 2024). These failures damage relationships between communities and other stakeholder groups, reduce the impacts of ecotourism projects, and harm communities'

perceptions of these projects (Spencely, 2014; Tarino & Purnomo, 2024; Winchenbach et al., 2019). Conversely, meaningful and sustained communication about project costs and benefits can be a useful tool for building relationships and strengthening trust.

Simply understanding desired benefits, however, is insufficient. Processes for distributing benefits remain flawed and often fail to provide sufficient incentives to all individuals and communities impacted by the establishment of tourism projects (Spenceley, 2014; Snyman, 2020; Tumusiime & Vedeld, 2012). Even when inequities are not deliberate, they can damage relationships within communities and between communities and other stakeholders, ultimately compromising the success of ecotourism programs (Mbaiwa et al., 2008). Additionally, positive impacts of tourism do not necessarily trickle down to the community level (Castiglioni et al., 2020; Kuvan & Akan, 2005). Agreements around what, when, and how much will be distributed to stakeholders—especially communities closest to and most impacted by tourism development—are critical to minimizing issues with sharing benefits from tourism and strong collaborations with communities are essential to these agreements (Persha et al., 2011; Snyman & Bricker, 2021).

While recommendations to create benefit sharing agreements stress involving community members throughout the entire process (Cossengue et al., 2025), continued assessment and revision of these agreements and benefit sharing protocols are equally important (Duong et al., 2024; Snyman & Bricker, 2021; Snyman, 2020). Benefit sharing agreements are often not equitably distributed both among and within communities (Mensah, 2017; Spenceley, 2014; Tumusiime & Vedeld, 2012), but a better understanding of the long-term consequences of this inequity is needed (Dayour et al., 2024). One key component to monitor is social impacts; that is, how both benefit agreements and actual benefits received influence the state of collaborations.

As mentioned, perceived inequality and unmet expectations of benefits can elicit conflict and feelings of resentment between local communities and other stakeholders like tourism operators and government agencies (Gumede & Nzama, 2020). It is well established that these tensions can have major negative impacts on the success of ecotourism and conservation projects in general (Gumede & Nzama, 2020), but perceived inequality in benefit sharing agreements and distribution can also harm relationships among communities surrounding ecotourism destinations or among individuals within the same community. It is therefore key to investigate ways to improve real and perceived balance in benefit distribution for both the sake of communities and the long-term viability of ecotourism programs (Cossengue et al., 2025; Tarino & Purnomo, 2024).

Collaboration with local communities in ecotourism development

Efforts to develop or expand tourism should involve input from and collaborations with a wide variety of actors, including government agencies, tourism operators and other professionals, and people living in and around the area being developed (Sentanu et al., 2023; Wang & Fesenmaier, 2007). Historically, however, the tourism industry in developing countries, including throughout much of Africa, has failed to adequately consider the needs and desires of people living in targeted areas (Cleveland, 2021; Harilal & Tichaawa 2020) despite the fact that ecotourism and tourism adjacent to protected lands can burden local communities through limitations on land and resource use (Acquah et al., 2017; Thondhlana & Cundill, 2017). Excluding communities from tourism planning and development may compromise the success of these ventures by engendering negative feelings towards them – even to the point of retaliation – and continue a cycle of reduced community involvement (Duong et al., 2024; Gumede & Nzama, 2020).

There is increasing recognition of the positive benefits of strong involvement of local communities to both communities themselves and the success of ecotourism programs. Firstly, from an ethical standpoint, community involvement can be an important component of ensuring that these groups continue to manage and control their land and its resources (Tarino & Purnomo, 2024). Additionally, this step can drive success of ecotourism ventures by facilitating the incorporation of community knowledge. This information can help collaborators create better infrastructure and tourism development (Tarino & Purnomo, 2024). Assessing community values, needs, and concerns is also useful because doing so can reveal effective communication and conflict resolution strategies (Cossengue et al., 2022; KC et al., 2022; Warinda et al., 2024), and ensure that tourism programs are not in conflict with cultural norms or desired benefits (Tarino & Purnomo, 2024). These considerations are important for community acceptance of tourism ventures, thus increasing their likelihood for success (Boley et al., 2015; Li & Hunter, 2015; Wisnumurti et al., 2020).

Despite the potential benefits of meaningfully incorporating local communities, challenges remain. Collaborative relationships, especially when there are underlying power dynamics, can be complicated to manage. This dynamic often emerges in ecotourism development when entities like government agencies or nongovernmental organizations have access to greater resources than local communities (Cossengue et al., 2025). Power imbalances can even exist within local communities when certain individuals have higher status or better access to initiatives (Duong et al., 2024). Within those relationships, issues like lack of transparency and poor communication can have major implications (Bichler & Lösch, 2019; Dragouni & Fouseki, 2018; Sentanu et al., 2023). Additionally, tension and lack of trust can linger from past programs and historic failures of effective engagement, impacting even

unrelated tourism initiatives (Djosetro & Behagel, 2020; Sentanu et al., 2023). All of these social dynamics need to be acknowledged and addressed in order to effectively collaborate with local communities in ecotourism development.

Collaborative governance literature and theory, which has not been utilized to its full potential in the tourism field (Bichler & Lösch, 2019; Cossengue et al., 2025), represents one potential framework to analyze and then improve and shape collaborations throughout tourism development. Using this approach may be particularly useful for engaging local communities in these programs because it emphasizes building trust, pooling resources, and shared learning (Emerson & Gerlak, 2014; Innes & Booher, 2018), which may also have important implications for building capacity. Additionally, strategies outlined in the collaborative governance literature include practical guidelines like prioritizing face-to-face interactions, providing more information to all stakeholders upfront, and emphasizing small wins over long-term achievements (Ansell & Gash, 2008; Bettis et al., 2021; Bichler & Lösch, 2019). When correctly utilized, these steps have great potential to strengthen relationships and build trust, which is critical for ethical and effective collaborations with local communities and other stakeholders.

Tourism in Sierra Leone

This study focuses on exploring desired tourism benefits and their social consequences in Sierra Leone, a small nation located in coastal West Africa. Sierra Leone is an interesting case study because of its recent efforts to establish its first integrated, nation-wide ecotourism circuit after several major negative events over the past few decades. This timing provides the opportunity to both inform tourism development and emphasize local community involvement, as well as to contribute to the general theory on collaborative tourism governance and best practice.

Sierra Leone is considered a developing country with 43% of its population living below the poverty line in 2018 (World Bank, 2020). In 2022, it was ranked 181 out of 191 countries on the Human Development Index (United Nations Development Program, 2022). Much of the population lives in rural areas and relies on farming and/or hunting for subsistence and income (Sesay et al., 2023). Even though unrestricted hunting and timber harvesting have taken a massive toll on Sierra Leone's wildlife and environment, it is still home to a host of wildlife species, including chimpanzees and many types of birds (Sesay et al., 2023).

From 1991-2002, Sierra Leone was ravaged by a civil war that left an estimated 70,000 people dead and 2.6 million displaced (Kaldor, 2006). Such conflict, particularly in developing nations, can have long term impacts on how potential travelers perceive safety, which likely lowered visitor numbers in years following (Kimani, 2021). Additionally, the war had major direct negative impacts on tourism infrastructure. For instance, during the fighting, many hotels, restaurants, and other tourism establishments were demolished (Shakya, 2009).

The decade following the war saw major efforts towards recovery focused on the economy, infrastructure, and citizen wellbeing (Millar, 2012; Pushak & Foster, 2011). There was also progress in the tourism sector, both in terms of infrastructure development and increases in visitors (Kongoley-MIH, 2015; Shakya, 2009). Unfortunately, this recovery was delayed and circumstances worsened by the Ebola epidemic that ravaged Sierra Leone, Liberia, and Guinea from 2014 to 2016 (Kongoley-MIH, 2015; Nyenswah et al., 2016; Shakya, 2009). The outbreak necessitated diverting resources and funds from other areas of development, including tourism, for emergency response use (Kongoley-MIH, 2015). Other impacts on the tourism industry included drastic decreases in the number of flights to the region, and thus visitor numbers, out of safety concerns. As a result, many tourism facilities struggled to stay open and to pay staff,

which contributed to skyrocketing unemployment rates in Sierra Leone at this time (Kongoley-MIH, 2015).

Sierra Leone's proposed ecotourism circuit

The tourism industry in Sierra Leone has always had massive potential, with beautiful beaches, unique culture and history, and breathtaking biodiversity in wildlife species such as chimpanzees, a wide variety of birds, and pygmy hippos (Brown, 2020; Kongoley-MIH, 2015). Now that Sierra Leone is out of crisis, major efforts are once again turning towards strengthening this industry via a structured nationwide tourism circuit. A major renovation has already been completed at Lungi National Airport, facilitating an increase in the number of flights to Sierra Leone from Europe and other regions. The country has also simplified the visa process, so travelers can now receive one on arrival instead of having to go through the process ahead of time. Both changes have increased the accessibility of Sierra Leone in hopes of increasing visitor numbers. There are also plans in place to construct additional hotels and other accommodations for tourists and plans to better market the country's beaches (Halpern, 2023).

Tacugama Chimpanzee Sanctuary, located just outside the capital of Freetown, is playing a major role in the ecotourism component of this larger project. The sanctuary has long term plans in place to both expand its research facilities and build a carbon-neutral exhibition hall focused on chimpanzees. More immediately, Tacugama is establishing tent-stay facilities in Loma Mountain National Park targeted at drawing increased numbers of birdwatchers. They are also planning to open two one-bedroom ecolodges on the island of Jaibui, aimed at wildlife viewers interested in seeing species like pygmy hippos (Condé Nast Traveler, 2023).

This study: Objectives and rationale

Many tourism sectors in other countries have had to adapt existing practices and programs to be more in line with their ecotourism goals (Siakwah et al., 2020), but Sierra Leone is still in the early stages of establishing its tourism industry. As such, there is an opportunity to proactively focus on communicating with stakeholders (including communities) about what tourism benefits are important to them and what they would like to see, as well as to examine whether proactively incorporating local communities means that their concerns and goals are more effectively integrated. One way to evaluate these questions is by exploring the connection between benefit sharing and subsequent tensions and negative feelings, as well as positive feelings or perceptions among communities.

This study utilized a qualitative semi-structured interview protocol to assess desired benefits, concerns, and perceived cons of tourism development among a variety of stakeholders involved in the development of Sierra Leone's tourism circuit.

Methods

Study site

This study focused on several ecotourism development sites in Sierra Leone. Interviews with tourism officials and industry professionals took place in the capital city of Freetown and surrounding Western Area Peninsula, where most government agencies and other larger organizations are located. Members of several communities surrounding Loma Mountains National Park were also interviewed because the ecotourism circuit plans include development of birdwatching, hiking, and other tourism initiatives in the area. Finally, members of several communities in the Jaibui region of Sierra Leone were interviewed because Tacugama

Chimpanzee Sanctuary was in the process of constructing two eco-lodges for tourists traveling to view wildlife and visit Jaibui Island.

Participants

Participants were recruited through a combination of purposive, snowball, and convenience sampling. For tourism officials (n=2) and other industry professionals (n=5), key informants were identified, interviewed when possible, and asked to recommend potential additional interviewees. In the Loma Mountains area, the lead author traveled to the Mansofinia community, where Tacugama was hosting a women empowerment workshop with individuals from across the region. Participants were recruited through convenience sampling as breaks in the workshop allowed (n=18). In the Jaibui area, key informants were identified in the small community directly across from Jaibui Island as they are most involved in and impacted by ecotourism development. Interviewees in other, surrounding communities were recruited through a combination of purposive (community leaders) and convenience (community members willing and able to participate) (n=11). Altogether, we conducted 36 interviews, but the audio recordings from 2 were lost and an additional 3 interviews from the Loma Mountains region were excluded after it was determined that consent protocols were not adequately followed, resulting in a final count of 31 analyzed interviews.

Semi-structured interview procedure

The Virginia Tech Institutional Review Board (Protocol # 24-020) reviewed the study protocol. All interviews were conducted in person and audio recorded between January 2024 and February 2024. Interviews took place in a mix of English, Krio, Kuranko, and Mende. All interviews not in English were translated in real time by a native speaker. We utilized verbal

consent due to literacy issues throughout the country. Each interview followed the same general script (Appendix C), but the semi-structured approach afforded the opportunity to adapt, including with follow-up questions. Interview questions focused on previous experiences with tourism, trends in tourism, desired benefits of increased tourism, potential cons to increased tourism, the process of developing the ecotourism circuit, and how different groups and individuals are collaborating to develop the circuit. Interviews were recorded and transcribed by the lead author.

A follow up was planned for in the spring of 2025, in which the lead author would travel back to Kambama village near Jaibui to evaluate whether ecotourism programs were incorporating the communities' reported desired benefits and community members' perceptions of ecotourism development. This trip was not possible because individuals in Kambama would not allow anyone associated with Tacugama to visit until they resolved conflict over expected benefits with the director. At the time of writing, that resolution has not taken place. In order to better understand what happened and best next steps forward, the lead author also had a telephone conversation with a former Tacugama outreach team member in November 2025.

Analysis

Interview transcripts were qualitatively coded using ATLAS.ti software (version 25.0.1). A thematic analysis approach was taken, utilizing a combination of inductive and deductive codes. Deductive codes were based on background research about potential benefits from ecotourism (Hunt et al., 2015; Stronza & Gordillo, 2008) and the research questions. Inductive codes were generated from transcripts, then categorized into more general-level themes. The lead author then compiled deductive and inductive codes into a codebook after three rounds of coding (Appendix D). For consistency, a co-author then randomly selected three transcripts to code.

These codes were compared to the lead author's coding for the same transcripts to establish inter-coder reliability. Discrepancies in codes used were discussed by both authors and resolved with little to no difficulty, supporting validity of the coding system and process. Table 3-1 provides an annotated codebook outlining the codes we focused most on in this study.

Table 3-1: Select qualitative codes

THEME	**DESCRIPTION**	
Subcategory	Description	Sample quote
Community partnerships	Collaborative relationships with communities	*"You can have co-management with the community people for them to involve tourists. For them to feel belong"*
Tourism benefits	Current and potential positive impacts of tourism	
Development	Infrastructure growth (includes education, water, and other resources)	*"That is more beneficial to even the community people because the more tourists come here, the more development we get."*
Economic benefit	Ways tourism brings in money (including scholarship money)	*"Well, tourism is very good because I have heard or read about other countries, tourism bring income to the nation, you know."*
Employment	Jobs provided by tourism industry	*"And, also, there'll be an employment. Some of the some of the guys we've seen, some of the ladies, some of everybody that we've seen here could get a job. It's going to our tour guides. They can be tour operators. They can be cooks. They can be, like, cleaners. So these are all job creation for the community as we normally we do normally propose those ideas to them."*
Tourism challenges	Difficulties in sustaining and growing tourism	
Benefit sharing	Agreements or systems for distributing economic and other positive impacts of tourism	*"And also she is saying maybe the negative will be like pressure on our end of how we distribute the finances. So for instance, when the tourists come, there should be a clear discussion to say we should pay 2 Leones, 3 Leones. This much should go to the community. This one should go to Tacugama. This one should go to…"*
Cost	Expenses of tourism in Sierra Leone (including relative to other countries)	*"In addition to that, yea one of the negative things that will affect us one day are the cost of the destination. It is very expensive."*
Reputation	Association of Sierra Leone with war, Ebola, etc.	*"You know, we are on this aspect of rebranding our narrative, changing our story. All of this, where people are hearing about war, war, Ebola and all the rest."*
Tourism cons	Negative consequences of tourism	
Culture	Practices or expectations of tourists that clash with local customs	*"Yes, because our community is very, very remote, we are living a remote hut here, it might be an effect, what I am saying here, because it might be bad for us as a citizen or bad for them because of our culture. Maybe they are coming, they love to take alcohol."*
Disease	Illness potentially spread among people	*"Just for the disease because most of disease, different kind of sickness. So you see that is why I am worried, while I like them to be in my country."*

Land conflict	Disagreement over use and control of land	*"And then also, pressure for land. So like if, when the tourists are coming now, and then later on the agreement is made, it's not been fulfilled. So like this will create a huge, huge problem."*
Unsustainable development	Growth of communities and infrastructure occurring at too large/too rapid a scale	*"So some of the potential bad things I can see conflict on land. There will come a time, maybe people will come that wants to build like huge, huge thing that put in more money than what tourism can bring."*
Tourism process	How tourism functions	
Planning growth	Strategies to increase tourism	*"So Sierra Leone is serious about tourism, but we need to make more seriousness and more foundation for it. For localities, you can see. We have some mountains around these areas. They have very tourism potential there. They go there. In other actions, you have to have, to create access to those places."*
Tourism governance	How tourism policies and procedures are managed	*"One of the policies that we are doing currently, we have our strategic plan on sustainable development, our master plan. This master plan is the policy that speaks to the other documents. The first thing I told you about, the national tourism development policy that was developed in 2017, here the ecotourism, you see an action plan in 2017."*
Tourism infrastructure	Processes and physical facilities necessary for tourism	*"He is explaining that they need help for like when the tourists come, they need to have a structure here, something like guesthouse so when they are coming, they will be there. And that guesthouse will be in the community. People from different places can stay there."*
Tourism training	Formal training and education for employment in tourism sector	*"And the school here, they have improved the curriculum to have tourism. Colleges and universities are beginning to have this certificate."*

Positionality statement

The authors of this article acknowledge their positionality as white, western, academic researchers, all demographics that make them outsiders in this study. There is a high probability that just the presence of the first author (who conducted the semi-structured interviews in Sierra Leone) influenced participants and their responses. The authors attempted to minimize this influence by conducting community member interviews in local languages with Sierra Leonean staff from Tacugama.

Results

Tourism benefits

Interviewees identified a range of current and potential benefits of the tourism industry in Sierra Leone. Main benefits highlighted by interviewees in a variety of roles including tourism officials and community members were development, economic benefits, and employment. "Development" included infrastructure growth such as water wells, access to education, and construction of buildings. "Economic benefits" referred to increased income at individual, community, and national levels. For instance, as Interviewee 13 explained:

> At this point, it is good because it brings income to our communities, that is the first thing. Because when they are here, they have to pay for their lodging and other accommodations. So it is an income for us.

Relatedly, "employment" referenced possible jobs provided:

> If the ecotourism component comes in, then they will earn something more because the tourists will come, hire them to go for a walk, so they can get something out of that. So that's the idea. So they will benefit. And of course, the tourists going to come there and of course, you have to take care of them. You need to cook for them, so that means the womenfolk will get employed into that. It's a remote place; you've got to employ some of the fishermen and have one place they can sell their fish, things like that. We have been doing some small-scale gardening and we think we can probably improve that, so probably target certain things that can be bought from them to use it for the tourists. (Interviewee 21)

Additionally, 18 out of 29 community members interviewed in Loma and Jaibui also mentioned contact with tourists from other countries as a benefit. Interviewees talked about a

range of relationships, from one-off interactions and conversations to more developed relationships like enduring friendships and romantic relationships. Speaking of tourists, one interviewee expressed:

> I want to see them be here, so that I will be friends with them, then maybe I will have my love there, I will have a friend, a brother or sister there. So that's why I want them to come in this country. (Interviewee 4)

Reasons these connections were considered benefits included forming bonds and exposure to new cultures. Learning was also mentioned as a benefit of these connections because "when tourists come, our people learn from them. We learn from them, they learn from us too" (Interviewee 30). Even interviewees who said they only saw tourists from afar or not at all expressed a desire to interact with them for the same reasons.

While most interviewees could point to benefits that they wanted to see come out of ecotourism development, community members did not necessarily know what benefits government agencies and NGOs like Tacugama were seeking to provide via their initiatives. Combined with the fact these tourism initiatives have yet to bring much in terms of benefits, it is challenging for community members to know what to expect, both in terms of types of benefits and how they will be distributed. This lack of communication and common understanding has the potential to be consequential to this ecotourism program's success because it can erode trust and impact communities' willingness to participate (Duong et al., 2024).

Tourism challenges

Interviewees mentioned a variety of challenges to developing and increasing the tourism industry in Sierra Leone. Those acting in official capacities, such as tourism operators, and government officials, most often spoke of big picture challenges such as Sierra Leone's

reputation and the high cost of visiting the country. These interviewees explained that the combination of the civil war and the Ebola epidemic have contributed to a lingering global perception of the country as unsafe, which they are working to counteract through media campaigns and word of mouth. Additionally, the cost of traveling to Sierra Leone is high; it is difficult for Sierra Leone to remain competitive when other West African countries are often more affordable to travel to and around because "when you consider the flight cost, you consider the cost of hotel, mostly people are going to choose to go to these other countries because Sierra Leone is an expensive destination" (Interviewee 20).

Interviewees from all stakeholder groups spoke of the challenge of facilitating tourism with a poorly developed road network. Many tourism destinations (ecotourism ones in particular) are located off of rocky, dangerous roads that require motorbikes or four-wheel drive cars with experienced drivers to access. Additionally, many of these dirt roads deteriorate and "infrastructure issues will come in because most of these areas are almost not accessible during the rainy season" (Interviewee 21). While the main challenge noted for seasonality was road access during the rainy season, general tourism demand during this time of year was noted as both currently and potentially lower than during the dry season.

Tourism cons

The overwhelming majority of members of various communities reported no negative experiences or concerns with current tourism trends or hypothetical growth of the industry. However, two concerns were mentioned by community members in both Jaibui and Loma areas: the potential for disease transmission and cultural incongruencies. Disease mainly referred to the possibility that "if tourists come here, maybe like certain diseases are being transmitted by just like touching me" (Interviewee 4). The potential cons of cultural differences centered around

behaviors interviewees would disapprove of, such as sexual activity or the possibility that "maybe they are coming, they love to take alcohol" (Interviewee 13).

Tourism professionals, including industry members and government representatives, mentioned additional potential cons around land conflict, whether that be disagreements within families about the use of land for tourism purposes or concerns of community members that tourism development would compromise:

> Ownership of their land. So that, like, they will think that organization that is running the tourism thing could be like land grabbers. Taking their lands from them, keeping it from them. So, like, they think about that a lot. (Interviewee 28)

Another notable con was concern around unsustainable development of the tourism industry, and therefore, land around specific tourism destinations and Sierra Leone as a whole. Examples given included large hotel construction and road network development disrupting wildlife habitat.

Benefit sharing challenges

Interviewees also brought up lack of established procedures for fairly distributing economic and other benefits from tourism. One interviewee described issues with:

> Pressure on [the community's] end of how we distribute the finances. So, for instance, when the tourists come, there should be a clear discussion to say we should pay 2 Leones, 3 Leones. This much should go to the community. This one should go to Tacugama. This one should go to… (Interviewee 22)

The lack of clear procedures around benefit sharing was also mentioned by officials involved in ecotourism design. One interviewee from Tacugama spoke of the difficulty of developing benefit sharing agreements when program profits, as well as the input required of different stakeholders,

remain unclear. According to him, it is also challenging to manage expectations around ecotourism benefits. When programs such as this circuit are being piloted and intentionally kept small, they will likely not generate large amounts of economic or other benefits. This limitation aligns with other research which has found that ecotourism is often more successful as one component of a larger livelihood initiative (Mutanga et al., 2022; Tarino & Purnomo, 2024). Additionally, there is also a history of disagreement over what benefits the communities would like to receive (i.e. constructing a central meeting area) versus what organizations view as appropriate to provide (i.e. a water well).

The interviews also revealed larger, wide-reaching challenges related to collaborations between communities and entities like NGOs, as well as benefit sharing processes that accompany them. In both the Jaibui and Loma areas, interviewees from communities not directly involved in tourism development spoke of tension and bitterness towards communities they perceived to benefit more from the implementation of these programs. One resident of Kambama, the community geographically closest to and most involved in the development of the Jaibui sites told interviewers, “it’s like [we’ve] got series of backlashes because of joining [Tacugama] and like people saying you’ve got a white guy who is coming here and supporting [us] deeply” (Interviewee 25). These tensions are an established pattern in the wake of perceived inequality of ecotourism benefit sharing among different communities (Warinda et al., 2024). Looking more specifically, interviewees expressed additional frustration with perceived inequality in employment opportunities. Members of multiple communities were unhappy with their understanding of who was generally hired to work as guides or do manual labor – again, members of Kambama were viewed as benefitting disproportionately. They mentioned wanting a more transparent hiring process, one more open to members of other communities.

Collaboration: opportunities and challenges

Effective collaboration is intertwined with all of the other challenges and opportunities associated with ecotourism development. Stakeholders are more likely to see the benefits, work to overcome barriers, and ultimately contribute to program success if they are engaged and their wants and needs are genuinely considered and included (Cossengue et al., 2025; Stronza & Gordillo, 2008; Weaver, 2014).

Collaboration is fundamentally about relationships. According to an interviewee, community members' perceptions of project partners constantly coming and going has not been helpful to building those relationships. Additionally, tension, both generally and specific to the eco-tourism project, makes these collaborations sensitive to handle, necessitating a strong understanding of the social landscape. One interviewee repeatedly mentioned the need for a staff member based permanently or semi-permanently in the project areas to build trust with communities, describing it as "very critical and very, I would say, delicate to handle those communities because they have a lot of internal politics the social relationships within and between communities in the area" (Interviewee 34). Currently, much of that responsibility falls on Tacugama's director, but his availability and other commitments make this need a major limitation on what collaborative work can take place and when.

Interviewees were explicitly asked about multistakeholder engagement in ecotourism development and discussed a wide range of collaborations. There was strong consensus among members of all interviewee groups about the importance of collaborating with local community members, especially with regard to cultural tourism and ecotourism sites located near villages. The current state of those collaborations, however, was less clear. Tacugama representatives spoke of many ongoing community projects over the years, including and especially with

communities near Loma and Jaibui, and how the trust they have built has facilitated ecotourism development. Government officials and tourism operators spoke more about working with communities for cultural tourism, to develop infrastructure, and capacity building, but did not give concrete examples or experiences. It was unclear whether that desire was aspirational or based on previous collaborations.

Several community members in the Loma and Jaibui area, however, expressed strong desire to be more included and to have a more impactful role in developing and implementing tourism projects. One such interviewee discussed the potential for better collaborating to "have co-management with the community people for them to involve tourists. For them to feel belong" (Interviewee 2) but that he was not aware of any such collaborations currently taking place. Interviewees from the Loma and Jaibui areas noted several challenges impacting how prepared they felt to engage in ecotourism, including communication issues (mainly language differences), limited tourism infrastructure in their communities (guesthouses, for instance), and a need for training related to working in the tourism sector. This discrepancy between desire and reality represents an opportunity for stronger collaboration because while officials recognize trainings and infrastructure development as important, current efforts are not as wide-reaching or involved as community members in Loma and Jaibui feel they need to be successful.

Discussion

This study examined tourism development in Sierra Leone from the perspectives of a variety of stakeholders, including government officials, tourism operators, and members of communities near both Loma Mountains National Park and Jaibui Island. We explored the nature of collaborations, desired benefits, existing concerns, and perceived cons of tourism development.

The timing of this study provided a unique opportunity to assess what different groups of people, including local community members who have historically been excluded from tourism development, would like to gain from the sector as it emerges. There was strong consensus on desired benefits across stakeholder groups. Government officials, tourism operators, and local community members in both Loma and Jaibui repeatedly spoke of hopes for economic benefits (both at a local and national level), increased jobs, and infrastructure development like the construction of schools and water wells. These desired benefits are consistent with those identified in other ecotourism programs covered in the literature (Hirami & Hidalgo-Morales, 2025; Stronza & Gordillo, 2008; Weaver, 2014).

Responses around challenges, cons, and partnerships indicate that there is much room for improvement as far as relationships, both generally and specific to ecotourism development. Looking at the Jaibui area in particular, tensions both among communities and between communities and other organizations appear significant. Repair is likely needed for these groups to collaborate effectively on projects.

A more collaborative approach

Research on collaborative governance theory and practice shows that an interviewee's proposal to base staff in the Jaibui area permanently or semi-permanently has potential to build trust and a deeper understanding of issues on the ground (Innes & Booher, 2018), which can be key in implementing successful projects. The current reliance on Tacugama's director as a key point of contact in the Jaibui area impedes progress, as ecotourism development in particular is on hold until he is able to work out issues, but doing so is extremely difficult from a capacity standpoint. Sierra Leone is facing major issues of encroachment and deforestation, which threaten tourism to the country in general (Acland, 2025), and also demand much of the

director's time and attention. As a result, our follow-up interviewee explained that he has been unable to travel to Jaibui over the past few months, with ecotourism development stalling in the meantime. Having someone else establish solid relationships with these communities could be key in working around this challenge.

Additionally, stronger, more consistent relationships with communities could open avenues of communication to work out issues, which will be critical in maximizing benefits in practice and ensuring ecotourism programs are sustainable in the long-term (Cossengue et al., 2025; Holladay & Powell, 2013). Work on collaborative governance has consistently shown that this type of relationship, or at least efforts to move in that direction, are essential for successful collaboration (Ansell & Gash, 2008). Rebuilding trust and leadership that prioritizes doing so have long been noted as particularly important when there is an imbalance of power and resources (Gray, 1999; Susskind & Cruikshank, 1987), as is evident in this ecotourism example when comparing stakeholder groups like local community members and organizations in charge of development of the circuit.

One example of this lack of trust, effective communication, and power imbalance in this study is the concern that two community members expressed around land-grabbing for developing tourism infrastructure. No other stakeholders gave any indication that this process was planned or even considered, and the community members did not explain where it originated from, but it showed how community members may not feel a sense of control equal to other stakeholders in the process. Because such imbalances can also impact stakeholders' incentives to participate in collaborative processes (Bradford, 1998; Warner, 2006), they cannot be overlooked. These components of collaborative research and literature offer an opportunity to examine motivations of stakeholder groups and what is needed out of leadership organizations

(Emerson & Ahn, 2021). As such, moving forward with these ecotourism circuit development projects will likely require taking a step back, rebuilding trust, and establishing common expectations for the project and its results (Ansell & Gash, 2008; Tett et al., 2003).

Another key theme to note in considering trust and relationships in ecotourism development is the tension among different communities as a result of perceived imbalances in benefit distribution in the Jaibui area. Addressing both the frustration of slighted communities and the resulting backlash towards members of Kambama, the community closest to Jaibui and most closely involved in constructing ecolodges, will be critical for the long-term success of ecotourism development in the area. Again, having a permanent or semi-permanent staff member located in the area could significantly improve relationships and build trust with both groups, especially with the acknowledgement that ecotourism benefits are likely insufficient to support multiple communities or even many individuals. Tacugama already works on other livelihood initiatives in the area, such as livestock and farming, so greater involvement and more demonstrated support for these projects could help allay some of the tension.

Overcoming logistical and social barriers

Community members in Jaibui and Loma repeatedly mentioned challenges around physical infrastructure and tourism-related skills. There are great opportunities for government agencies and tourism operators to take this feedback and help build capacity within communities by providing resources and training. Capacity of communities near tourism attractions is critical for the success of the industry (Khaledi Koure et al., 2023), with other research showing lack of training and infrastructure can be major obstacles for success (Bello et al., 2016; Kunjuraman & Hussin, 2017). Efforts to increase skills and infrastructure would be a worthy investment for these stakeholders. Perceived cons of tourism growth also indicated concerns around threats like

the spread of disease and cultural differences, which again are common community concerns in other research (Duong et al., 2024). Open communication about these concerns with trusted partners can go a long way in managing them and making communities feel heard, hopefully driving their investment in the success of the ecotourism projects (Cossengue et al., 2025; Tarino & Purnomo, 2024).

Finally, stronger partnerships may also be critical to managing expectations about what benefits to expect and when to expect them. Several government officials and tourism spoke of the importance of keeping tourism development manageable, which will have implications for benefits like how much money the sector generates and how many jobs are created. Community members in Jaibui and Loma did not seem aware of the planned gradual development in their statements on the impact of tourism development and therefore may have had unrealistic expectations around likely benefits. In both locations, lack of transparency around benefit sharing resulted in frustration of communities, both in perceived inequality of benefit distribution among individual communities and also a mismatch between what community members expected and what had materialized. These unfulfilled expectations can be very detrimental to communities' willingness to participate in ecotourism programs, and subsequently the success of the programs themselves (Hirami & Hidalgo-Morales, 2025).

One tourism professional interviewed described pressure from communities to establish more concrete benefit sharing agreements, which would go a long way in providing concrete expectations of benefits. Of course, it is challenging to develop these types of arrangements when practitioners and policy makers are also unsure of exact numbers around funds generated by this sector and other benefits, but the desire for these agreements underscores communities' frustration with not knowing and another opportunity for improved communication. Improving

communication with communities around proposed tourism destinations could help prevent disappointment and resentment resulting from lower-than-expected benefits (Mbaiwa et al., 2008).

Conclusion

Even though there is room for improvement, ecotourism development in Sierra Leone still holds promise. It is by no means a panacea; like other ecotourism destinations, it will likely be limited to an alternative livelihood for portions of local communities rather than a source of income and development for all (Mutanga et al., 2022; Tarino & Purnomo, 2024). Additionally, much research on ecotourism projects is critical of their ability to provide tangible and sustainable benefits to stakeholders, especially local communities (Voumard, 2019). But the consensus from interviews in both Loma Mountains and Jaibui areas is that it is a welcome initiative and there is general consensus among stakeholder groups as to desired benefits. As a result, if ecotourism circuit development continues in Sierra Leone, planning and implementation that maximizes both potential success and ethics will be imperative. Collaborative governance represents a valuable framework to utilize in this process and addressing challenges that have already emerged.

The main obstacles to overcome are strained relationships and communication troubles. As an NGO with long-lasting relationships in both areas, Tacugama will be an important collaborator in these programs, bridging the gap between local communities and various government agencies (Susilo & Diharto, 2018). During a follow-up interview, the former Tacugama staff expressed confidence that the organization will be able to repair relationships with communities in the Jaibui area, especially if they are able to add individuals whose main

role is working and collaborating in the region, adding capacity, building trust, and ultimately driving effective collaboration.

The broader lessons from this case are around the importance of meaningful, collaborative engagement. Once trust is eroded, it is very hard to restore. Once the benefits of a project or initiative have been distributed, is very hard to reallocate. Once tourism infrastructure has been developed, it is very difficult to redesign. The ecotourism sector in Sierra Leone is at an important inflection point amidst nascent efforts to develop new opportunities to the benefit of both the natural environment and human communities. A collaborative approach may help to overcome barriers and ensure that communities' needs are met.

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Appendices

Appendix C – Chapter 3 Interview script

Interview script – Tourism officials

Hi, my name is [name]. I'm a [role] working with the Tacugama Chimpanzee Sanctuary to interview people who are or may be involved with or impacted by tourism development in Sierra Leone. We are interested in your experiences with tourism, what benefits you would like to see from it, and concerns you have about it. This research may be used to inform future tourism programs in the area. When I am finished, you and your community will receive a copy of the results.

The interview is expected to take no more than 30 minutes of your time. The interview is completely voluntary. If at any point during the interview you want to stop or to skip a question, we can do so. There are no right or wrong answers to any of these questions. You may also ask me questions about the study at any point.

All of your responses are confidential; I will not be recording your name. Your name and contact information therefore will not be released or associated with your answers. In addition, there are no known risks or benefits to participating in this interview. *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Polytechnic and State University.*

Verifying age of potential participant
How old are you? (Proceed if subject is at least 18 years of age)

Consent
Would you be willing to participate in this interview? (If yes, proceed)
Is it ok if I record our conversation to help me keep track of your responses? I will also take some notes. (If yes, turn on digital voice recorder and proceed.)

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

- What is your role in [your organization]?
- What kinds of work does [your organization] do to foster tourism development?
- What kinds of trends have you seen in tourism to and within Sierra Leone in recent years?
- Could you tell me about the process of developing the tourism circuit?
- Are you modeling it after any other examples of tourism?
- What obstacles do you see to increasing tourism?
- What benefits do you hope to see come out of increasing tourism? Environmental? Social? Cultural? Economic?
- What are the short term/long term goals of the tourism circuit?
- Do you see any costs or downsides to increasing tourism in Sierra Leone?
- What did you think of chimp week this past year?
- Do you think chimp week had an impact on tourism?
- How do you think we can improve/better publicize chimp week to draw tourists?
- Is there anything else you would like to add about tourism development in Sierra Leone that you think would be important for me to know?

Interview script – Community Members

Hi, my name is [name]. I'm a [role] working with the Tacugama Chimpanzee Sanctuary to interview people who are or may be involved with or impacted by tourism development in Sierra Leone. We are interested in your experiences with tourism, what benefits you would like to see from it, and concerns you have about it. This research may be used to inform future tourism programs in the area. When I am finished, you and your community will receive a copy of the results.

The interview is expected to take no more than 30 minutes of your time. The interview is completely voluntary. If at any point during the interview you want to stop or to skip a question, we can do so. There are no right or wrong answers to any of these questions. You may also ask me questions about the study at any point.

All of your responses are confidential; I will not be recording your name. Your name and contact information therefore will not be released or associated with your answers. In addition, there are no known risks or benefits to participating in this interview. *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Polytechnic and State University.*

Verifying age of potential participant
How old are you? (Proceed if subject is at least 18 years of age)

Consent
Would you be willing to participate in this interview? (If yes, proceed)
Is it ok if I record our conversation to help me keep track of your responses? I will also take some notes. (If yes, turn on digital voice recorder and proceed.)

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

- What community are you from?
- Do you know what tourism is?
- Have you seen tourists (people visiting from other places) around the area?
- Have you had experience with tourism (people visiting from other places) before? Was it good, bad, or neither?
- Did you know Sierra Leone is trying to increase tourism?
- Did you know they would like more tourists to come visit Loma Mountains?
- Have you been involved in that at all? If so, could you tell me about that process?
- Do you think good things could come from more tourism? If so, what?
- What would you like to see come out of more tourism?
- Do you have any worries about more tourism? If so, what and why?
- Do you see anything bad about tourists visiting the area? If so, what and why?
- Is there anything else you would like to add about tourism development in Sierra Leone that you think would be important for me to know?

Interview script – Tourism outfitters

Hi, my name is [name]. I'm a [role] working with the Tacugama Chimpanzee Sanctuary to interview people who are or may be involved with or impacted by tourism development in Sierra Leone. We are interested in your experiences with tourism, what benefits you would like to see from it, and concerns you have about it. This research may be used to inform future tourism programs in the area. When I am finished, you and your community will receive a copy of the results.

The interview is expected to take no more than 30 minutes of your time. The interview is completely voluntary. If at any point during the interview you want to stop or to skip a question, we can do so. There are no right or wrong answers to any of these questions. You may also ask me questions about the study at any point.

All of your responses are confidential; I will not be recording your name. Your name and contact information therefore will not be released or associated with your answers. In addition, there are no known risks or benefits to participating in this interview. *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Polytechnic and State University.*

Verifying age of potential participant
How old are you? (Proceed if subject is at least 18 years of age)

Consent
Would you be willing to participate in this interview? (If yes, proceed)
Is it ok if I record our conversation to help me keep track of your responses? I will also take some notes. (If yes, turn on digital voice recorder and proceed.)

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

- What is your role in [your organization]?
- What kinds of work does [your organization] do to foster tourism development? What kinds of tourism is it involved in?
- How does your [your organization] collaborate with other groups like government agencies, nongovernmental organizations, and local communities on tourism development?
- What kinds of trends have you seen in tourism to and within Sierra Leone in recent years?
- Have you been involved in developing the tourism circuit? Could you tell me about that process?
- What obstacles do you see to increasing tourism?
- What benefits do you hope to see come out of increasing tourism? Environmental? Social? Cultural? Economic?
- What are the short term/long term goals of the tourism circuit?
- Do you see any costs or downsides to increasing tourism in Sierra Leone?
- Is there anything else you would like to add about tourism development in Sierra Leone that you think would be important for me to know?

Interview script – Other

Hi, my name is [name]. I'm a [role] working with the Tacugama Chimpanzee Sanctuary to interview people who are or may be involved with or impacted by tourism development in Sierra Leone. We are interested in your experiences with tourism, what benefits you would like to see from it, and concerns you have about it. This research may be used to inform future tourism programs in the area. When I am finished, you and your community will receive a copy of the results.

The interview is expected to take no more than 30 minutes of your time. The interview is completely voluntary. If at any point during the interview you want to stop or to skip a question, we can do so. There are no right or wrong answers to any of these questions. You may also ask me questions about the study at any point.

All of your responses are confidential; I will not be recording your name. Your name and contact information therefore will not be released or associated with your answers. In addition, there are no known risks or benefits to participating in this interview. *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Polytechnic and State University.*

Verifying age of potential participant
How old are you? (Proceed if subject is at least 18 years of age)

Consent
Would you be willing to participate in this interview? (If yes, proceed)
Is it ok if I record our conversation to help me keep track of your responses? I will also take some notes. (If yes, turn on digital voice recorder and proceed.)

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

- Could you describe the process of designing the new ecotourism ventures?
- How have you worked with partner organizations throughout that process? What has collaboration looked like?
- How would you like collaboration with partner organizations to look moving forward?
- Are there ways you and partner organizations are making contributions to local communities throughout the development process?
- Could you tell me about sustainability and the new tourism ventures planned?
- Will there be agreements in place for distribution of portions of profits to local communities?
- Will these ecotourism ventures provide jobs to local people? Capacity building?
- Do you expect indirect benefits to local communities, financial or otherwise?
- What other potential benefits do you expect to come to Sierra Leone from increasing tourism?
- Do you see any cons or potential negative consequences from increasing tourism in Sierra Leone?
- Is there anything else you would like to add about tourism development in Sierra Leone that you think would be important for me to know?

Appendix D: Chapter 3 complete codebook

Ecotourism codes

THEME	**DESCRIPTION**	
Subcategory	Description	Sample quote
Communities	Mention of a specific community	*"I am from Bandakerfai community."*
Desire for increase	Interest in higher rates of tourism in immediate area or Sierra Leone as a whole	*"I would be very happy if Sierra Leone increases tourism because as you can see, it's a beautiful country. The country is very beautiful, especially if you come to the protected area like the Loma Mountain."*
Experience	Positive or negative evaluations of tourism	*"Yes, we can see them, we can see them. We can see the tourists with the cars all the time at times."*
Partnerships	Established relationships/collaborations	
Community partnerships	Collaborative relationships with communities	*"You can have co-management with the community people for them to involve tourists. For them to feel belong"*
Donor partnerships	Collaborative relationships with (generally international) donors	*"If the donor, the donors are coming, the donor realized that Loma Mountains is very much attractive to the international world. And they can come in as partners."*
Government partnerships	Collaborative relationships with and between government agencies	*"So when you look Sierra Leone, we have huge potential. You know, the tourism is still untapped. So, yeah, I think we just need support from the government."*
Partnerships- general		*"But sometimes, we may go into some partnerships and you may have some problems. But I always look at it as all part of that learning. You know we go through, ideally where we can learn from it and see whether we need the same partner to continue or another one comes in. So collaboration, yea, it's just you don't know until you get into it. But mostly I would say, the majority of the time, it goes well."*
Tacugama	Mention of Tacugama Chimpanzee Sanctuary	*"Except that since I've been here, except that Tacugama is working very closely with our institution. That is why sometimes I really appreciate the way Tacugama is."*
Purpose	Reason tourists come	*"Because some people like to come to Africa to see the nature, learn from them. Wildlife species that we have in Africa, they want to come and see them and enjoy the scenery that we have in Africa."*
Role	Individual's job in tourism industry	*"Of course, normally the way people come here, the tourisms, they come, at times, I lodge them. We even take them to the Loma Mountains."*
Sustainability	Long-term viability of tourism projects	
Tourism benefits	Current and potential positive impacts of tourism	

Conservation	Protection of wildlife and environment	*"He is saying that deforestation is the biggest challenge they are facing here. He is just explaining that their people are really against them being stopped not to cut the trees. So like if there is a compensation that is given to the people to stop cutting trees through tourism, it can be better for them."*
Development	Infrastructure growth (includes education, water, and other resources)	*"That is more beneficial to even the community people because the more tourists come here, the more development we get."*
Economic benefit	Ways tourism brings in money (including scholarship money)	*"Well, tourism is very good because I have heard or read about other countries, tourism bring income to the nation, you know."*
Employment	Jobs provided by tourism industry	*"And, also, there'll be an employment. Some of the some of the guys we've seen, some of the ladies, some of everybody that we've seen here could get a job. It's going to our tour guides. They can be tour operators. They can be cooks. They can be, like, cleaners. So these are all job creation for the community as we normally we do normally propose those ideas to them."*
Relationships/interaction	Connections or engagements with tourists	*"So maybe the tourists feel good here, feel at home. So like interaction is what she is saying. Like you come from different places and you meet here, you make new friends is what she's saying."*
Benefits- other		*"Well, she is saying that she doesn't know what good will come out of it, but she is happy that she is seeing you. She knows that something good will come out of it. It will have benefit."*
Tourism challenges	Difficulties in sustaining and growing tourism	
Benefit sharing	Agreements or systems for distributing economic and other positive impacts of tourism	*"And also she is saying maybe the negative will be like pressure on our end of how we distribute the finances. So for instance, when the tourists come, there should be a clear discussion to say we should pay 2 Leones, 3 Leones. This much should go to the community. This one should go to Tacugama. This one should go to…"*
Cost	Expenses of tourism in Sierra Leone (including relative to other countries)	*"In addition to that, yea one of the negative things that will affect us one day are the cost of the destination. It is very expensive."*
Reputation	Association of Sierra Leone with war, Ebola, etc.	*"You know, we are on this aspect of rebranding our narrative, changing our story. All of this, where people are hearing about war, war, Ebola and all the rest."*
Seasonality	Challenges of rainy season	*"I think infrastructure issues will come in because most of these areas are almost not accessible during the rainy season, so that will be like the low season."*
Tourism challenges- other		*"So and I think the sites again, you know, for some of the sites, we have lots of poor management. So, which are huge challenges. You will go to one place today. Everything will be working today. Then when you go there a week after, you know, it's different."*

Transportation	Limitations of road network/accessibility of locations in Sierra Leone	*"And for some other sites, when you consider the access, the accessibility, the road network, you know, so it also makes it difficult to to visit some of these places."*
Tourism cons	Negative consequences of tourism	
Absence of cons	Stated lack of negative experiences/expectations	*"I asked him what is his own worry so that tourists can be able to come here. He said no, he's not worried about any tourists coming."*
Culture	Practices or expectations of tourists that clash with local customs	*"Yes, because our community is very, very remote, we are living a remote hut here, it might be an effect, what I am saying here, because it might be bad for us as a citizen or bad for them because of our culture. Maybe they are coming, they love to take alcohol."*
Disease	Illness potentially spread among people	*"Just for the disease because most of disease, different kind of sickness. So you see that is why I am worried, while I like them to be in my country."*
Land conflict	Disagreement over use and control of land	*"And then also, pressure for land. So like if, when the tourists are coming now, and then later on the agreement is made, it's not been fulfilled. So like this will create a huge, huge problem."*
Tourism cons- other		*"Well, this one from my own perception, for now the country is very peaceful. Sometimes we, when people come from different countries, some of them, we suspect them to be spies, you know, coming in to spy on us, you know."*
Unsustainable development	Growth of communities and infrastructure occurring at too large/too rapid a scale	*"So some of the potential bad things I can see conflict on land. There will come a time, maybe people will come that wants to build like huge, huge thing that put in more money than what tourism can bring."*
Tourism locations	Specific places for tourism in Sierra Leone	*"But the little I know, these people that we are seeing, like we have beauteous national park in Sierra Leone. We have this Loma Mountain. I think we have another park in… the Gola forest."*
Tourism process	How tourism functions	
Learning from other places	Examining tourism in other regions/countries to inform tourism development in Sierra Leone	*"Another one came about last year to teach us about this tourism accounts. From, just to have some guys from Gambia, they came and help us."*
Planning growth	Strategies to increase tourism	*"So Sierra Leone is serious about tourism, but we need to make more seriousness and more foundation for it. For localities, you can see. We have some mountains around these areas. They have very tourism potential there. They go there. In other actions, you have to have, to create access to those places."*
Tourism governance	How tourism policies and procedures are managed	*"One of the policies that we are doing currently, we have our strategic plan on sustainable development, our master plan. This master plan is the policy that speaks to the other documents. The first thing I told you about, the national tourism development policy that was developed*

		in 2017, here the ecotourism, you see an action plan in 2017."
Tourism history	Establishment of tourism processes	*"So when the government said we have a lot of potential, what they did was start national development, and tourism was in that cluster too. And that is one of them. We have protected tourism as a key that can transform the economy."*
Tourism infrastructure	Processes and physical facilities necessary for tourism	*"He is explaining that they need help for like when the tourists come, they need to have a structure here, something like guesthouse so when they are coming, they will be there. And that guesthouse will be in the community. People from different places can stay there."*
Tourism process- other		*"When you are leaving the country, we have few questions we ask you. What you experienced in Sierra Leone, to know how we can improve, where we have our strengths and weaknesses, SWAT analysis."*
Tourism training	Formal training and education for employment in tourism sector	*"And the school here, they have improved the curriculum to have tourism. Colleges and universities are beginning to have this certificate."*
Tourism trends	Demonstrated patterns in tourism flow over time	*"They are they we have we've seen a a an increase in the number of people coming, but then we probably don't get, you know, as much as we need. And COVID was no help. So but, yeah, I think, the last 5 month in, 2023 Yeah, you know, we we we saw a turn even with VSL. We see, we increased."*
Tourism types	Different kinds of tourism	
Cultural tourism	Community traditions tourists can witness/participate in	*"Yes, like, sometimes, when tourists used to come, our people, our traditional people used to make some dance that would be very much attractive to the tourists."*
Domestic tourism	Tourism within Sierra Leone	*"We we try to encourage domestic tourism, especially during COVID."*
Ecotourism	Small-scale, conservation-oriented tourism with a focus on the environment/wildlife	*"We are now moving away from this mass tourism, trying to transition to ecotourism because we are considering the environment."*

Chapter 4: Broadening the One Health Framework: Advancing Collaborative Governance in Sierra Leone

Authors: Victoria Hymel, Ibrahim Kamara, Todd Schenk, and Gillian Eastwood

Abstract

The One Health framework ostensibly aims to take a holistic approach towards health and safety threats and the connections between human, animal, and environmental systems. However, its applications in research and practice often focus disproportionally on human public health threats, especially on zoonotic disease transmission to humans. This trend has extended to Sierra Leone, a key study site for expanding the breadth of One Health because it has experienced deadly natural disasters, such as landslides and flooding, resulting from rapidly increasing deforestation and other forms of environmental degradation. The country also faces growing issues with sanitation, pollution, and access to food and water, all of which tie back to environmental health. Therefore, in order to truly tackle health and safety holistically in Sierra Leone, the One Health platform must incorporate and address these broader threats. One pathway for doing so is by strengthening collaborations across disciplines, sectors, and levels of governance. This study engaged key stakeholders, including representatives from government agencies focused on disaster management, environmental protection, and agriculture; nongovernmental organizations; One Health researchers; and industry partners to explore opportunities for strengthening cross-boundary collaborations in the One Health platform in Sierra Leone. Findings confirm the rapidly growing environmental health threats, willingness to better incorporate said threats into One Health, and highlights challenges in putting collaborative plans and policies into action. This study has broader implications for informing what sectors and disciplines will be critical in the One Health framework as environmental threats like

deforestation, urbanization, and climate change, as well as their associated health impacts, continue to grow and shift worldwide.

Introduction

One Health

The One Health framework outlines strong interconnectedness between human, animal, and environmental health and the mutual threats they face. It also underscores the necessity of developing interdisciplinary strategies and policy to address these challenges using a variety of related sectors to ensure the comprehensiveness of plans and projects (Faijue et al., 2024; Ogunseitan, 2022). However, in both research and practice, One Health work has focused disproportionately on the human and animal components of this framework (Castañeda et al., 2024; Schurer et al., 2016). Fields like veterinary science, disease ecology, and public health- those tied to human and animal health- are often overrepresented and overemphasized in collaborations (Binot et al., 2015). The environmental component of the One Health framework has been neglected by comparison (Destoumieux-Garzón et al., 2018; Papadopoulos & Wilmer, 2011). This imbalance is contradictory to how many relevant organizations define health. The World Health Organization, for instance, outlines health as "a state of complete physical, mental, and social well-being and not merely absence of disease or infirmity" (2002). It has also stated that public agencies have a duty to protect ecosystem health and human health from all forms of environmental threat (Destoumieux-Garzón et al., 2018). This holistic view of health, which the One Health movement embraces much more in theory than in practice, necessitates consideration of a wide range of threats to health.

The cost of not considering and integrating environmental health as an equal component of One Health research and practice creates an incomplete understanding of threats with the

potential to impact every component of the system (Ortiz-Millán, 2025). Healthy, intact ecosystems play critical roles in mitigating diseases and other health threats that can reach people, animals, and plant life within ecosystems (Johnson & Thieltges, 2010; King, 2014; Stephen & Berezowski, 2024); deforestation, climate change, and other factors degrading ecological integrity can greatly compromise these capacities (Lerner & Berg, 2015; Shehu et al., 2024). Deforestation in particular has been identified as a major factor facilitating the spread of infectious disease across the world (Morand & Lajaunie, 2021; Purse et al., 2023; Rabinowitz et al., 2018). In addition to how it impacts the environment's ability to contain disease, deforestation also impacts human and animal behavior, leading to increased contact rates and opportunities for disease transmission (Krause, 1994; Morse, 1995; Sanga et al., 2024). Climate change and deforestation have been associated with increases in the frequency and intensity of extreme weather events and natural disasters (Black & Butler, 2014; Patz & Hahn, 2013; Taylor et al., 2022), which can be major factors in the spread of disease through pathways such as flooding increasing breeding sites for mosquito vectors (Adekunle et al., 2019; Prow et al., 2014); increased crowding of refugee centers facilitating disease spread (Kanamori et al., 2021); and changing environmental conditions driving shifts in sanitation and mechanisms by how diseases persist and spread (King, 2014; Ward et al., 2024).

While the impacts of these events on disease are notable and have the potential to devastate already-vulnerable communities and ecosystems, natural disasters and extreme weather events also threaten health and safety in other ways. One Health as a whole, however, has a heavy focus on studying and addressing zoonotic disease compared to other health implications (Destoumieux-Garzón et al., 2018; Khan et al., 2018; Papadopoulos & Wilmer, 2011), meaning it misses the implications of other threats to health. Dangerous events like earthquakes, flooding,

and landslides are directly responsible for many deaths and serious injuries (Cappelli et al., 2021). They also often have long-term negative impacts on food availability, infrastructure capacity for sectors like healthcare, damaged or destroyed housing, and other more indirect influences on human health (Cappelli et al., 2021). Similarly, wildlife and domestic animals are also impacted by natural disasters themselves and by resultant habitat and environmental destruction (Rondeau et al., 2020). Importantly, because climate change and deforestation are only predicted to worsen in the coming years, examining all the health implications of such trends is critical.

General consideration of the governance of One Health systems—that is, what it actually looks like in practice and how individuals and institutions drive and inhibit work—on the whole is limited (Elnaiem et al., 2023; Stephen and Stemshorn, 2016). While the lack of attention to environmental factors has been noted by researchers for years (Destoumieux-Garzón et al., 2018; Lee & Brumme, 2013), this imbalance remains an enduring issue and limits the effectiveness of One Health theory and practice (Castañeda et al., 2024). Stronger consideration of policy and governance of this framework is critical for ensuring effective collaboration, reliable funding, and effective interventions (Ortiz-Millán, 2025). Relatedly, social science research methods remain underutilized despite the potential they have for gathering valuable information about the reality of One Health work and the experiences and perspectives of those involved (Humboldt-Dachroeden, 2020; Lapinski et al., 2015). These research gaps underscore the need to examine the processes and factors that both limit and drive success of One Health. As such, social science methods are invaluable in capturing perspectives and observations from those working in the field, as well as their insights into how people actually work together both within and across sectors (Woldehanna & Zimicki, 2014). Our study here focuses particularly on cross-sectoral

collaborations, as well as how to strengthen existing and facilitate new ones, as an avenue for increasing the scope of the environmental component of One Health theory and practice to include the overarching threats of deforestation, natural disasters, and climate change in order to effectively address health.

Collaborative governance

Partnerships across human, animal, and environmental sectors have been consistently noted in the literature as critical to the success of One Health, but limited or nonexistent in practice (Faijue et al., 2024; Lee & Brumme, 2013; Manlove et al., 2016). An approach grounded in collaborative governance could be key to optimizing partnerships as this model aims for consensus building around methods for addressing various threats (Ansell & Gash, 2008). Collaborative governance processes can be especially effective in dealing with complicated and wide-reaching threats, including both immediate health concerns, and the underlying environmental conditions associated with them (Bianchi et al., 2021). Benefits of such processes include pooling of (often limited) resources (Emerson & Gerlak, 2014); long-term time efficiency (Ansell & Gash, 2008); building trust (Innes & Booher, 2018); and more adaptable, effective plans than any one entity could produce on their own (Bryson et al., 2015; Emerson & Gerlak, 2014). One Health researchers and practitioners specifically often run into issues of resource scarcity, jurisdictional conflicts, and cross-disciplinary communication (Faijue et al., 2024), so effective collaborations have great potential for helping overcome such challenges and increasing involvement of those implicated in, impacted by, and tasked with managing the environmental threats described above.

Environmental and health threats in Sierra Leone

This study focused on Sierra Leone as a case study of expanding and integrating the environmental component of One Health by exploring cross-sector collaborations focused on health threats in the region. Sierra Leone is a small country located in coastal West Africa and has a population of 8.1 million people. With 43% of its population living below the poverty line in 2018, it is considered a developing country (World Bank, 2020). It ranks 181 out of 191 countries on the Human Development Index (United Nations Development Program, 2022). Illegal timber harvesting occurs in the country, and the resulting deforestation has had many negative impacts on the health and safety of humans, wildlife species, and the overall environment, and exacerbates the significant risks of future crises.

At the end of the country's brutal decade-long civil war in 2002, millions of citizens were internally displaced, and many resettled around the capital, Freetown. This increased development pressures (Mansaray et al., 2016), precipitating encroachment into the nearby Western Area Peninsula National Park (WAPNP), one of the country's major protected natural areas (Gbanie et al., 2018). Development and resource extraction pressures on the national park forest have continued in the years since and the accompanying illegal timber harvesting, along with bushmeat hunting has had major impacts on wildlife populations and degradation of the overall ecosystem in Freetown and WAPNP (Fayiah, 2021; Larson et al., 2016). Rapid landscape changes and deforestation contributed to a massive and deadly landslide in the Freetown area in 2017, and these factors continue to pose significant risks of similar humanitarian disasters (Cui et al., 2019).

The 2014 outbreak of the Ebola virus disease, which began in Liberia before spreading to nearby Guinea and Sierra Leone (Nyenswah, 2016), had significant consequences for the

country, its people, and its economy (Elston et al., 2016; Scott et al., 2016). The outbreak necessitated diverting resources and funds from other areas of development for emergency response use (Kongoley-MIH, 2015). It also resulted in lasting impacts on many sectors within Sierra Leone including health and health infrastructure (Elston et al., 2016; Scott et al., 2016), industry (Dramé et al., 2021), income/employment (Davis, 2015) and tourism (Kongoley-MIH, 2015). The odds of a similar zoonotic disease outbreak increase as deforestation continues due to a variety of reasons, including habitat fragmentation and loss altering ecological and climatic conditions, disruption to biodiversity and vector communities, and increased contact rates among humans, domestic, and wild animals, facilitating cross-species disease pathogen spillover (Ellwanger et al., 2022; Ghai et al., 2022; Tajudeen et al., 2022).

Public health research in Sierra Leone has increasingly been utilizing the One Health framework to try and prevent the recurrence of such an outbreak. Embrace of this approach began shortly after the Ebola epidemic and has expanded in the years since. International collaborations focused on use of this approach in Sierra Leone have increased and strengthened (Gbow, 2024; University of Wisconsin-Madison, 2023). Academic research has investigated using it in rural areas of the country in the face of a fragmented health care system (Barr et al., 2019; Suluku et al., 2018). These efforts, however, have no clear involvement from the forestry or agriculture sectors in Sierra Leone, who are very relevant partners for considering how unsustainable development and deforestation, as well as resulting habitat loss, zoonotic disease exposure, and deadly natural disasters, impact health. Initiating these collaborations and the integration of these sectors into Sierra Leone's One Health work could strengthen the country's ability to respond to human and environmental health threats.

Methods

Procedure

The Virginia Tech Institutional Review Board (IRB Protocol # 24-1331) reviewed and approved the study protocol, interview and focus group questions, and recruitment materials. The study format incorporated two key components:

Semi-structured interviews and fuzzy cognitive modeling

Interviews were conducted in person and virtually over Zoom (Zoom Video Communications Inc., 2024). Written consent to conduct and record interviews was obtained ahead of time and re-affirmed verbally at the time of interviews. Each interview followed the same general script (Appendix E), although the semi-structured approach allowed for variations in the order of questions as well as for interview-specific follow-up questions. Interview questions focused on participants' experiences working in public health, wildlife conservation, and/or environmental management, as well as with the One Health framework; their observations about connections among these sectors regarding health; and whether/how they collaborate with individuals or entities from other sectors. To stimulate discussion, interviewees also prepared fuzzy cognitive models of their understanding of the system, including environmental, human, and animal health issues, as well as how they are connected, which entities work to address them, and aspects that should be included moving forward. Constructing and examining these models from a qualitative standpoint allowed participants to explain their perspectives and opinions, as well as how their internal representations of these systems influence their decision-making in their professional roles (Gray et al., 2013; McLain & Lee, 1996). Figure 4-1 is a sample fuzzy cognitive map completed by one interview participant.

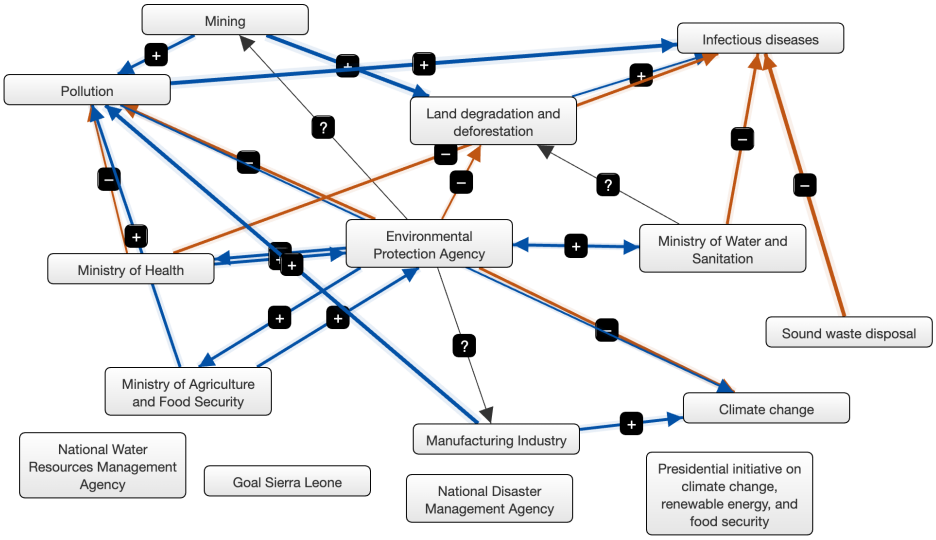

Fig. 4-1: Sample fuzzy cognitive map. Arrows indicate direction of relationship. Blue/+ indicates a positive correlation. Red/- indicates a negative correlation. "?" indicates a connection between system components that is neither positive nor negative. Line thickness corresponds to strength of correlation. Components without an arrow represent ones the interviewee saw as important but not currently included.

Focus group

The second component of this study was an in-person focus group, a technique that has been used often to engage and prompt discussion among groups of experts dealing with One Health issues (Degeling & Rock, 2020). This focus group was led by the first author (an American woman) and the second author (a Sierra Leonean man). The second author's contributions in framing discussion questions and identifying and explaining nuance in participants' responses were invaluable in making this focus group and the subsequent analyses as culturally appropriate and accurate as possible (Pinto da Costa, 2021). Written consent to conduct and audio record the focus group was obtained ahead of time and re-affirmed verbally at the time of the event. The focus group followed a general script (Appendix F), but the nature of the discussion was open-ended and therefore was shaped by issues and priorities of the participants (Pinto da Costa, 2021). The initial script and target questions were based on issues and priorities mentioned in the semi-structured interviews, as well as collaborations identified

during the fuzzy cognitive modeling as effective, useful and/or important to strengthening relationships moving forward. Topics included prioritizing different health and safety threats; improving imbalance among human, animal, and environmental health sectors in One Health; and concrete steps to better move collaboration from plans to action. Participants were compensated 200 NLE (about 9 USD) for transportation to the focus group site.

Participants

Semi-structured interviews and fuzzy cognitive modeling

Semi-structured interview participants in Sierra Leone were recruited through a combination of purposive and snowball sampling (Newing et al., 2011). Key informants were identified, interviewed when possible, and subsequently asked for recommendations of any additional potential interviewees. Altogether, we conducted 14 interviews with 19 key stakeholders and experts on environmental, wildlife, and human health policy in Sierra Leone. Interviewees had a variety of current and past roles, including with government agencies (National Public Health Agency, National Disaster Management Agency etc.; n=11), nongovernmental organizations (Conservation Society of Sierra Leone and Concern Worldwide; n=4), research entities (Sierra Leone Urban Research Center and Njala University; n=3), and industry members (Guma Valley Water Company; n=1).

Focus group

Focus group participants were also recruited through a combination of purposive and snowball sampling (Newing et al., 2011). Interview participants were asked if they or someone else from their organizations would be willing and able to participate and if they had any recommendations for other potential participants. Subsequently, we conducted 1 focus group

with 7 participants from entities based in a range of sectors: nongovernmental organizations (Concern Worldwide, Conservation Society of Sierra Leone, and GOAL Sierra Leone; n=3), government agencies (Wildlife Department of the Forestry Unit, National Disaster Management Agency, and Ministry of Tourism; n=3), and an international health organization (World Health Organization; n=1).

Analysis

Interview transcripts were qualitatively coded using ATLAS.ti software (Version 25.01). A thematic content analysis approach was used, starting with the creation of inductive codes to limit the impact of prior expectations or biases on data analysis (Castleberry & Nolan, 2018; Vaismoradi et al., 2016). These codes were categorized into more general themes and used by the lead author to compile a codebook after two rounds of coding (Williams & Moser, 2019). The codebook and code definitions were discussed, adjusted if necessary, and eventually agreed on by coauthors. The lead author then performed a third round of coding to confirm the final codebook and assignment of codes to segments of each transcript. For consistency, the second author randomly selected a transcript to code using the same codebook. These codes were compared to the lead author's coding for the same transcripts to establish inter-coder reliability through discussion and agreement (Campbell et al., 2013). Discrepancies in codes used were addressed by first and second authors and resolved with little to moderate difficulty, but a moderate portion of the codes were not mutually exclusive. To address this, the lead author revised the codebook again to combine duplicate codes and eliminate unnecessary ones. The second author then randomly selected a second transcript to code using the updated codebook. The lead and second authors then performed a second round of inter-coder reliability using the same method. Discrepancies in codes used were addressed by both authors and resolved with

little to no difficulty. Table 4-1 provides an annotated codebook outlining the codes upon which we focused most in this study.

Table 4-1: Select qualitative codes used in the One Health Governance study in Sierra Leone

Theme	Description	Example quote
Addressing health/safety/environmental threats		
Enforcement	Activities and practices to ensure laws and policies are being followed	*"Why is the laws are there? Though they are stringent, but not effective, they are not enforcing the laws. In other words, people keep deforesting what we are planning."*
Legislation	Laws around management of wildlife, environment, and other human actions	*"And the the 1972, Wildlife Conservation Act, which, was, recently adopt I mean, amended in twenty twenty twenty twenty one, was it? Twenty twenty? 2022. Okay. Has some, huge effects on this, but most people are, you know, catching you know, animals from the forest and bringing them to I mean, for domestication or killing them, poaching."*
One Health	How the One Health framework is used in Sierra Leone	*"One of the advantage of Sierra Leone and One Health, there's collaboration at the ministerial level. All the people working are those are in those, the technical people. They are really working Ministry of Health, Minister of Agriculture, Minister of Environment. There's a very good collaboration between them."*
Collaboration		
Collaboration drivers and barriers	What motivates organizations or individuals to work with others; what facilitates collaboration	*"No one person can get it done. No one person can get it done. So or one department can get it done. We we need, like, we need the other sectors, the expertise."*
• Resource sharing	How funding, manpower, equipment, information etc. are re-allocated across boundaries	*"Well the beneficial aspect of it once it's One Health, all of you are working together, it brings unity. If there's resources, all of you are going to share, because this is One Health, it is not one individual personal property. So when the resources come, all of you, one way or the other are going to jointly implement the project."*
• Trust	Belief in the willingness and ability of others in collaborations	*"It's over time. Like, it's the execution of, projects. After project, project, after project. And I think that would be the best way I would describe it, like transparency, accountability, and demonstrated transparency and accountability over time has has contributed to the trust building."*

General challenges		
Governance challenges	Social and institutional factors that make collaboration, development, and implementation difficult	*"There's this lack of coordination. There is coordination, but there's this lack of coordination as who is to take control of these spaces."*
Sector imbalance	Disproportionate representations of various agencies and disciplines in One Health and related work	*"Because the Ministry of Health be its being a very strong institution and being, of course, having the resources in terms of human and even financial power seems to be driving the One Health. And if that happens, you will see the dividends of One Health be skewed towards the health, and that will not go well for the operations of the platform."*
Health and safety issues		
Land degradation/deforestation	Manipulating landscape through cutting down trees, development, or other means	*"The logging, the charcoal burning, the sand mining, the quarry, the expansion of settlements. All of these are huge threats that will affect the health, our health, because definitely we can't breath fresh air when we go down all the trees."*
Natural disasters	Environmentally based events threatening health and safety	*"And so just imagine the case of the landslide that happened. I don't know if you're aware of it. Intense raining rain coming within a short period. So you can imagine the risk that it presents, not only hazard risk, but even the health of people because a lot of people get injured apart from those who get who who die in the process. A lot of properties also get damaged."*
Pollution/Sanitation	Release of harmful substances into the environment; environmental contaminants	*"I think the the I think the most important one is probably pollution. Pollution from industrial activity. Very little enforcement of regulations or sometimes we don't even know the the sources and impacts. Pollution from use of chemicals to grow more food. Food we are now Feed Salone is the main strategy. Pollution from use of some hazardous chemicals in the mining sector."*

Positionality statement

The first, third, and fourth authors of this article acknowledge their positionality as white, western, academic researchers, all demographics that make them outsiders in this study. The first author has conducted two prior research projects in Sierra Leone, which has provided valuable insight into the culture and governance processes. There is a high probability, however, that just the presence of the first author (who conducted the semi-structured interviews and helped

facilitate the focus group in Sierra Leone) influenced participants and their responses. The second author is a Sierra Leonean conservation professional with a great deal of experience utilizing spatial methods to work on environmental issues in the Freetown area. His deep understanding of the study site and environmental governance mechanisms was crucial in developing study materials and analyzing qualitative data with much more nuance than would have otherwise been possible. His role in co-facilitating the focus group also strengthened its cultural legitimacy.

Results

Results described below are derived from analysis of both interview and focus group transcripts using the same codebook. Themes from both study components are synthesized unless otherwise noted.

Environmental health threats

Land degradation and deforestation

Interviewees identified a wide range of environmental threats facing Sierra Leone, most of which tie back to destruction of the natural environment. Virtually every interviewee mentioned land degradation and deforestation, which are rapidly growing concerns in Sierra Leone in general and in the Freetown Peninsula, home to the capital city and Western Area Peninsula National Park, in particular. This trend is a concern because, as one interviewee stated, "deforestation is connected to health" (Interview 2), in part because of how many practices drive it, including logging, unsustainable urbanization/encroachment, mining, and agriculture. Additionally, interviewees explained that deforestation and land degradation have devastating impacts for human, animal, and environmental health. Generally speaking, they negatively

impact the ability of forests to absorb threats, making all ecosystem components more vulnerable to impacts of climate change like sea level rise. They also drive disease, both in increasing contact among humans, livestock, and wildlife, which provides more opportunities for zoonotic disease transmission, and altering mosquito breeding sites so that people are more at risk than ever for diseases such as malaria. Clean water availability is also impacted, for instance in Freetown

> Because where we have the reserve, where we have the dam that supplies water, that area is being degraded. Now the land area is being exposed. The dam is being exposed to erratic sunshine. Drought is taking place. Dryness is happening. So what is happening to us in Freetown now? Instead of having twenty-four hours water supply, now water availability is being rationed. (Interview 5)

This loss of water also requires people to seek water from less regulated sources, which can be a source of water-borne diseases like cholera. Finally, deforestation and land degradation have major implications for soil quality and are associated with increasingly poor agricultural yields and subsequent food shortages.

Sanitation issues

In addition to water-borne disease stemming from deforestation, Sierra Leone is facing major challenges with sanitation and its impact on water quality and other health needs. Waste management services, in Freetown in particular, are ineffective, contributing greatly to littering, trash burning, and waste polluting water sources. Additionally, Sierra Leone has a significant challenge with air quality, which interviewees identified as largely the result of industrial emissions. Currently, industrial activity is poorly regulated and enforced, so the full extent of its impact is not clear. The mining industry in particular has massive impacts on both air and water

quality, with significant health consequences for humans, animals (both livestock and wildlife), and the environment as a whole. One interviewee spoke to the extent of mining and its consequences, saying:

> I mean, in the provinces where heavy minings are occurring, mercury pollutions are happening in Bo district. And if you go to Kono, the mining that is ongoing in Kono is almost. Now Kono is ravaged by huge mining underground. Nobody knows what will be the potential. I mean, the hazard effect of that into the future. Heavy mining of gold is happening in the north, and they are using mercury as the source of purifier. (Interview 4)

Mercury, an extremely dangerous heavy metal, is often used in artisanal and small-scale gold mining in the provinces of Sierra Leone. It is extremely toxic to inhale and so represents a major health threat to miners and their communities (United Nations Environmental Program, 2024). In Sierra Leone, it has also been making its way into various water systems and further threatens already waning access to safe, clean water for humans and animals. Mining and other sectors like agriculture and manufacturing also often use large amounts of unknown and unregulated chemicals and pesticides, which interviewees noted as a threat to air, water, and food quality and safety.

Natural disasters

According to the majority of interviewees, man-made environmental threats are also significant contributors to the increasing frequency and severity of natural disasters, with one interviewee noting that "quite a lot of the disasters have at their root environmental degradation" (Interview 1). To start with, they pointed to loss of tree and other plant cover as a major driver for erosion, which is in turn a risk factor for land and mudslides, as well as for floods:

> The absorptive capacity of the soil is almost now being overwhelmed. And this is so much because deforestation is taking place as well. And so just imagine the case of the landslide that happened. I don't know if you're aware of it. Intense raining rain coming within a short period. So you can imagine the risk that it presents, not only hazard risk, but even the health of people because a lot of people get injured apart from those who get who who die in the process. A lot of properties also get damaged (Interview 1).

Interviewees noted that with Sierra Leone's history of deadly landslides, this risk is a major and very real concern, especially as much deforestation is taking place directly on hillsides. While flooding and landslides are major risks during Sierra Leone's rainy season, deforestation is also associated with more frequent and intense wildfires during the dry season. As interviewees identified, all these natural disaster threats represent major threats to human, animal, and environmental health, as well as their safety.

Environmental factors and health

The fuzzy cognitive maps also allowed participants to visualize connections between environmental health conditions and health impacts on humans and animals. For instance, participants diagrammed strong connections between waste disposal and infectious disease; plastic pollution and clean water access; and deforestation and zoonotic disease. Taken with responses of expected increases in frequency and intensity of such threats, this result further underscores the importance of better incorporating these issues and the entities that work to mitigate them into Sierra Leone's One Health framework.

Future environmental health threats

When asked about what environmental health threats they expected to be significant in the coming future in Sierra Leone, interviewees largely pointed to worsening of threats already in existence. For instance, one interviewee mentioned trying to increase enforcement, "because the height at which the deforestation is going, if they are not halted, then we'll be talking of something else" (Interview 14). Disease was also expected to worsen, with factors including increasingly crowded living conditions, increased contact with wildlife, and decreased access to clean water contributing. Underlying and exacerbating these threats and their impacts:

> Poverty and inequality will still continue to persist in spite of the the different set of efforts done by different groups or agency. For that, definitely will undermine. And these are some of the key [unintelligible] related to health, that is the challenge as well. And most or some of these poor people, don't have access to safety, or social, I mean safety, I mean protection. I mean, a net, as well. So there is a whole other challenge as well. And that definitely undermines their health conditions. (Interview 10)

Additionally, the same interviewee explained how growing poverty and inequality form a vicious cycle with food insecurity, lack of access to clean water, unstable housing conditions, and the severity of the impacts of health threats like natural disasters. These natural disasters, including landslides, flooding, droughts, and wildfire, are also expected to increase in severity and intensity over time, especially if deforestation, climate change, and other big-picture factors continue progressing.

One Health in Sierra Leone

One Health structure

Interviewees gave an overview of the history and use of the One Health framework in Sierra Leone. Currently, the One Health platform and the office that manages it, the One Health Secretariat, are located under the National Public Health Agency, which itself is a component of the Ministry of Health and Sanitation. The One Health Secretariat also coordinates the agencies and other organizations involved in One Health in Sierra Leone. There are a number of different committees and subgroups within the platform, including a coordination committee and a range of technical working groups, some, for example develop guiding documents and policies, as well as deal with specific health threats like zoonotic disease and food-borne illness. At the time of interviews, collaborators were in the process of updating Sierra Leone's One Health governance manual. Responses were mixed, however, on the consistency and effectiveness of regular cross-sector One Health meetings. Many interviewees (particularly those in the One Health Secretariat) framed them as effective, but several focus group participants viewed them as infrequent and less effective than ideal. One focus group participant also strongly emphasized the importance of going beyond developing documents into ensuring they are popularized and actually put into practice.

Sectors and scales of governance involved

Interviewees reported a range of success with involving organizations and groups from diverse governance scales and sectors. Two interviewees evaluated One Health work as effective in Sierra Leone at higher levels; they noted national and regional scales as much more comprehensive and successful than those at local levels. Focus group participants described this gap is significant in part because so many health threats emerge at a community level and

stronger partnerships at this scale would allow for much earlier detection of them. They also explained that these collaborations may be key for increasing perceived legitimacy of initiatives in the eyes of community members. There are currently efforts to expand and strengthen the One Health approach at the community level, but it is challenging from a capacity standpoint to engage even a significant portion of these stakeholder groups. For instance, the Secretariat is working to train and provide resources for community-level health workers but has limited funds and physical resources to do so.

As far as sectors are concerned, one focus group participant explained that at high levels in One Health planning and practice:

> They have representative of human, animal, and environmental health. So at that level, it is proportional representation, at the Secretariat. But when it comes at the platform level, many a times you will find out that as far as participation is concerned, the number of human, animal, and environmental sector participants will never probably be equal in terms of proportion, proportionally. Why? If you consider key components as far as building capacity at the human, animal, and environmental interface is concerned. (Focus group participant)

While two interviewees expressed an opinion that human, animal, and environmental sectors' involvement in and control of One Health in Sierra Leone is currently balanced, the majority disagreed and expressed concerns over an imbalance and its implications for the country's ability to effectively address a range of health and safety threats. As mentioned above, capacity of the three sectors was overwhelmingly reported as unequal; interviewees noted factors from funds to manpower in local communities, that exert control over the One Health approach disproportionately in favor of the health sector. The focus group discussion even went as far as to

predict that capacity imbalances will prevent manpower among the three One Health components from ever being equal. Two interviewees also pointed to the fact that the Ministry of Health and Sanitation houses both Sierra Leone's One Health platform and One Health Secretariat as a major influencing factor in this imbalance. While there are currently discussions about shifting control of the platform to the Sierra Leone Vice President's office, which would be a more sector-neutral base, interviewees described unwillingness of the majority of the Ministry of Health and Sanitation to sacrifice control or to divert One Health resources and funds from their focal causes.

Comparing fuzzy cognitive maps of representatives from entities involved in the One Health system with those of representatives from entities currently not as integrated revealed a difference in perception of strength of relationship. Namely, representatives from the One Health Secretariat and Ministry of Health and Sanitation described stronger engagement of agencies like the Environmental Protection Agency and Ministry of Agriculture in the One Health platform than these agencies' representatives did. Additionally, representatives from the Forestry Division and National Protected Area Authority diagrammed relatively weak involvement in the One Health platform (but a desire to be better integrated) and were not included at all in the fuzzy cognitive maps of representatives from the One Health Secretariat and Ministry of Health and Sanitation.

Expanding interdisciplinarity

While there was not full consensus among interviewees as to the current state of interdisciplinary work in One Health in Sierra Leone, all interviewees reported seeing benefit in the involvement of a range of sectors and disciplines working to address a range of health threats at the human, animal, and environmental interfaces. Even the Ministry of Health and Sanitation

representative interviewed said that they supported this and was pushing for a shift of the One Health platform to the Vice President's office or another more neutral department, despite the fact that they received pushback from most of the Ministry:

> So that that power will be removed from Minister of Health. So that we will have everybody who come on board with, you know, we know with that equal mind that we are coming on a platform where we all play the game equally. (Interview 4)

Representatives from other entities, such as the Ministry of Agriculture and the Wildlife Unit under the Ministry of Environment and Climate Change reported both desires and efforts to be more involved in and influential to the One Health platform. Additionally, representatives from both the One Health Secretariat and other entities spoke of the Secretariat's recent deliberate efforts to develop both new and stronger interdisciplinary connections in their work.

When asked what cross-boundary collaborations they would like to see initiated or strengthened, interviewees largely responded with ones they had previously mentioned as missing. They repeatedly mentioned agencies under the Ministry of Environment and Climate Change (such as the Environmental Protection Agency, the National Protected Area Authority, and the National Disaster Management Authority) as key players to involve more consistently and proportionally. Two interviewees also pointed to the National Water Resources Management Authority as necessary, but not sufficiently included in One Health work, especially in the case of projects focused on water-borne disease. Two interviewees further brought up agriculture as a sector, but they stated that not much has materialized yet. Finally, an overwhelming number of interviewees highlighted the importance of strengthening the role of local communities in One Health work.

As far as threats addressed, the majority of interviewees described a disproportionate focus on disease—specifically zoonotic disease—in One Health work and research in Sierra Leone. They outlined multiple explanations for this, including more funds and capacity in the Ministry of Health and Sanitation, and the fact that the Ebola epidemic was the triggering event for formalizing the One Health approach in the country. Despite this trend, they also responded overwhelmingly in favor of expanding the range of threats addressed with the One Health framework to include those traditionally located in other sectors, particularly because "we know as far as human, animal, and environmental health is concerned, that interconnectedness is there. And the One Health approach is the only one that is used to address these issues" (Focus group participant). The other significant benefit they identified to broadening threats managed with One Health (to include deforestation, food security, clean water access, and similar issues) was the opportunity to strengthen relationships with local communities and individuals, thereby also facilitating stronger incorporation of these stakeholders into Sierra Leone's One Health framework.

Collaboration in One Health

Collaboration challenges

While one interviewee reported being satisfied with the current state cross-organization collaboration, all others reported the need for stronger, more balanced collaborations. They spoke of challenges they experience or witness in trying to collaborate, many of which have to do with governance or interpersonal issues. To start with, working across agencies, especially ones housed in separate ministries, comes with many difficulties. One interviewee explained that there are many bureaucratic obstacles to collaboration and that overcoming them often requires indirect approaches and utilizing existing relationships. Agencies often also operate with

incompatible, or even conflicting, remit goals, objectives, and approaches. Additionally, funding for interagency projects is reportedly rare, so:

> Directorates or departments or ministries, they get their own fund and they want to use it how they see fit. They don't want to ask somebody else to work with them to implement because they so it's it's like, trying to guard your own mandate, you know. (Interview 1)

As far as what components of collaboration are the most challenging, many interviewees pointed to difficulty of actually implementing plans, conversations, and even policies. Said one interviewee:

> It's not difficult to to set meetings or to speak to people, whether it's at the national or district levels. I think it's more the impact of the engagements or the outcome of those engagements. You know, things like having really clear action plans… It's just whether something then happens afterwards that's the challenge. (Interview 11)

Collaboration drivers

Interviewees also outlined factors they had noticed or experienced that facilitated effective collaborations in interdisciplinary health work and research. One of the most common drivers they identified was the added capacity offered by collaborations. Two interviewees mentioned the inability to accomplish tasks or deal with threats on their own, relying instead on manpower and resources from other organizations. Additionally, only some entities have control over activities like law enforcement, which necessitates that others work with them to address certain issues. Even in situations where collaboration is not strictly necessary, interviewees reported that it often drives better outcomes, more effective policies, and "always, at the end will produce good results if everybody is on board you know, to to do something" (Interview 8). They also said that successful collaborations increase willingness to engage in future ones later and

thus they build off one another. Interviewees identified many interpersonal characteristics and behaviors that make collaborations more likely to be successful, including respect, effective communication (such as face-to-face interactions in place of email), building relationships, and ability to see situations from another's perspective.

Key entities to include

Another component of the fuzzy cognitive maps was identification of organizations, agencies, and sectors who are not currently well incorporated into Sierra Leone's One Health framework but should be moving forward. Commonly mentioned entities included the National Water Resources Management Agencies; local communities and government agencies in charge of engaging them; and the National Disaster Management Agency. This result aligns with interviewees' responses to missing sectors and entities during interview discussions on Sierra Leone's One Health framework.

Discussion

This study examined the use of the One Health framework to address environmental threats in Sierra Leone, along with the potential of a collaborative governance approach to more effectively engage a range of stakeholders tasked with managing them. Representatives from various government agencies, nongovernmental organizations, and research institutions participated in semi-structured interviews and a focus group, during which they detailed their experiences and perspectives of cross-boundary collaboration as a tool to better deal with growing environmental threats like deforestation, unsustainable urbanization, pollution, and natural disasters. Overwhelmingly, participants reported value in utilizing a One Health approach

to deal with these environmental threats, in part because of the strong connections between those threats and other health and safety issues.

Interestingly, One Health focused efforts in Sierra Leone initially started with a much more holistic approach with a strong emphasis on environmental and social factors. While initially an informal adoption of the framework, work in rural communities on rabies virus risk eventually took on a more deliberate One Health approach (Suluku et al., 2018). Even though rabies is a zoonotic disease spread mainly through dog bites in Sierra Leone, researchers recognized that community members could not effectively address animal health and minimize rabies transmission while dealing with major impacts from food insecurity and waste disposal. They saw connections between those threats and rabies transmission and thus made them the target of One Health work. However, when Guinea, Liberia, and Sierra Leone formalized a regional One Health approach in the aftermath of the Ebola epidemic of 2014-2016, the focus shifted more exclusively to dealing with zoonotic disease transmission.

A finding arising from interviews is that, during the years since a One Health initiative was formed, the Ministry of Health and Sanitation in Sierra Leone has maintained a disproportionate amount of control over the One Health platform and of which health and safety threats are prioritized, largely because it is the formal home of the platform and One Health Secretariat. This structure runs directly counter to much collaborative governance literature that stresses the importance of neutral facilitation and management to maximize the success of cross-boundary work (Ansell & Gash, 2008; Bryson et al., 2015). The suggested relocation of the One Health platform to the office of the Vice President of Sierra Leone could likely go a long way in overcoming this aspect of the sectoral imbalance by building trust and decreasing pressure on the Ministry of Health and Sanitation to maintain power and control (Emerson & Gerlak; 2014).

The effectiveness of cross-boundary collaborations in One Health work in Sierra Leone is also likely impacted by imbalances and limitations on funding and other resources. Once again, interviewees spoke of the Ministry of Health and Sanitation managing a disproportionate amount of both money and manpower, giving the Ministry additional control over what health initiatives are targeted. Interviewees also observed that the Ministry would not have much incentive to share these resources, especially if doing so were to compromise its ability to address their priorities. Unfortunately, interviewees reported that donor money can come with strings or limitations that restrict organizations and agencies. For example, there are sometimes donor restrictions on providing funds to government agencies, only wanting to fund one specific sector, rather than a cross-sector initiative, or providing funds to start projects but not to maintain them. Additionally, focus group discussions explored how resource sharing is further complicated by the fact that funds for the One Health platform and its initiatives is extremely limited. Funding constraints and resource challenges can have a major negative impact on the success of collaborations, as one main benefit of working across boundaries is the opportunity to pool resources (Emerson & Gerlak, 2014). Organizations and individuals may be much less incentivized to participate in collaborations without this benefit.

Beyond logistical challenges to resource sharing, the majority of interviewees reported challenges with motivation and willingness of agencies to share things like funds or control of the One Health platform with other sectors. They described a strong tendency for organizations to protect their own mandate, or to push to prioritize their focal issues. Garnering support for initiatives that threatened this control was described as very difficult. For instance, one interviewee from the Ministry of Health and Sanitation explained that while he personally was in favor of moving the One Health platform to the Vice President's office, the vast majority of

people in his organization opposed this change and the loss of control of the platform it represented. As a result, he was unsure of whether this move would ever come to fruition despite the potential bigger picture, system-wide benefits. Interviewees also outlined how funding influences control of One Health and related programs; the lack of funding for the One Health means it overwhelmingly relies on the resources that specific agencies and organizations provide. As a result, well-endowed stakeholders have additional control over One Health work and agencies are further incentivized to not share funds with other entities in order to retain it. During the focus group, participants explained that such stakeholders are generally those focused on human health—in part because large international donors prefer providing funding for such initiatives.

Despite these difficulties, interviewees spoke overwhelmingly in favor of expanding collaborations. Even limitations on sharing across boundaries is not a hard and fast rule; some interviewees explained that their ability to perform necessary work would be virtually impossible without equipment and information sharing. Building on this trend would very likely drive both stronger existing collaborations and new ones. Other reported drivers of collaborations in Sierra Leone's One Health work were very much in line with those often identified and recommended in the collaborative governance literature, including building trust and respect (Innes & Booher, 2018); communicating face-to-face—especially when initially building relationships (Ansell & Gash, 2008); and the importance of perspective taking (Wald et al., 2017). The presence of these proven components of successful collaborative governance indicates that One Health work in Sierra Leone has promising roots for further developing and optimizing this approach.

Another promising factor for the success of cross-boundary collaboration in this setting is participants' recognition of which collaborations are those most key to initiate or strengthen.

Importantly, the collaborations identified aligned well with the health and safety threats that participants reported as most pressing and rapidly increasing. For instance, deforestation and land degradation were repeatedly mentioned as massive threats to the health and safety of humans, animals, and the environment. Participants connected them to increases in natural disasters (Black & Butler, 2014; Patz & Hahn, 2013; Taylor et al., 2022); food and water scarcity (Cappelli et al., 2021); and zoonotic disease transmission (Morand & Lajaunie, 2021; Purse et al., 2023; Rabinowitz et al., 2018), all of which were are consistently noted as impacts in other research. Furthermore, when subsequently asked about which entities should be better integrated into Sierra Leone's One Health platform, participants consistently pointed to those that are tasked with managing these threats and their impacts, such as the Environmental Protection Agency, the National Water Resources Management Agency, National Disaster Management Agency, and those working in the agricultural sector in interview discussions, diagramming fuzzy cognitive maps, and the focus group.

Recognition that these entities will play an increasingly key role in managing health and safety threats in Sierra Leone and that they should be better integrated into the One Health platform, along with the fact that the One Health Secretariat is deliberately trying to increase the platform's work across sectors, are important starting points to address environmental issues in a more holistic manner. Differences in perceptions of the current status of cross-sector involvement in Sierra Leone's One Health platform, however, may hinder efforts to strengthen these collaborations and addressing additional health threats. In both interviews and diagramming fuzzy cognitive maps, representatives of agencies such as the One Health Secretariat and the Ministry of Health and Sanitation reported stronger incorporation of agencies in other sectors like the Ministry of Agriculture and Environmental Protection Agency than did representatives

from these agencies themselves. Additionally, these health representatives did not mention the Forestry Division and National Protected Area Authority, agencies that are key in managing environmental threats and expressed interest in being more involved in the One Health platform. This trend could be an indication that these agencies have different perceptions of how much work is needed to strengthen cross-sector collaboration in One Health.

Looking forward, additional key challenges to putting these collaborations into practice and maximizing their effectiveness lie in balancing control of the One Health platform. Housing it in the Ministry of Health and Sanitation inhibits trust-building, addressing a range of health and safety issues (especially as environmental ones are expected to drastically increase), and also combines with the Ministry's higher capacity and funds to make the public health sector noticeably dominant over others. The other significant challenge that emerged in the interviews was the immense difficulty in taking collaborations from talking and planning through to actual implementation. During the focus group, participants discussed their thoughts on how to make this shift and brought up the following suggestions: balancing the roles of sectors, improving capacity for work at local and community levels, as well as for sectors other than health, and ensuring balanced representation in developing plans and policies. One participant also explained the importance of the process of a shift to implementation; they emphasized setting specific goals, clarifying each organization or individual's role, and exploring ways to make collaborators accountable to each other. The combination of big picture goals for the One Health platform and smaller, actionable steps for collaboration can hopefully be adapted by those working at the interface of human, animal, and environmental health threats, making efforts to address them more successfully overall.

Conclusion

Rapidly increasing deforestation and land degradation due to unsustainable urbanization, mining, and logging are currently decimating the landscape of Sierra Leone, particularly in the Freetown Peninsula. Semi-structured interviews and a focus group with representatives from government agencies, nongovernmental organizations, and research institutions revealed that the associated health and safety threats, including natural disasters like floods and mudslides, food and water scarcity, and zoonotic disease transmission necessitate a multi-sector approach. The One Health framework, which is based on strong connections among human, animal, and environmental health, will be incredibly helpful in working at the intersection of these health threats. Use of the framework has increased in Sierra Leone in the aftermath of the Ebola epidemic of 2014-2016, but it currently has a disproportionate focus on zoonotic disease and other human health threats. This imbalance is at least partially based in the high degree of control that the Ministry of Health and Sanitation has over the One Health platform. Combined with the Ministry's significant resources and capacity (at least, relative to other sectors such as environment conservation, wildlife and agriculture), this governance structure limits the One Health platform from addressing environmental threats like those listed above in an effective manner. Incorporation of a collaborative governance approach could also help strengthen collaborations across relevant sectors like disaster management, environmental protection, and even local communities. Using a collaborative governance approach to balance control of the One Health platform and available resources could go a long way in addressing environmental threats and their impacts, which will be critical as both are only expected to increase in intensity and frequency.

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Appendices

Appendix E: Chapter 4 semi-structured interview script

Hi, my name is Tori Hymel. I am a PhD student working with Tacugama Chimpanzee Sanctuary and my university, Virginia Tech, on a research project. We are interested in learning about your (organization, agency, etc.)'s roles in human, animal, and/or health research and practice, how you collaborate with representatives from other sectors, and how you think future cross-sector collaborations could improve health work, both One Health-focused and more generally.

As per the Information Sheet you reviewed, you may withdraw from this interview at any point without adverse consequences. Are you ok with me recording our conversation? Are you comfortable wearing this microphone?

The interview is expected to take about an hour of your time. Do you have any questions before we begin? *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Tech.*

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

One Health researchers and practitioners

- What is your disciplinary background/educational/work experience?
- What does One Health mean to you?
- What kinds of One Health topics do you generally work on?
- What aspects of One Health receive the most attention? Why these aspects and not others?
- What other researchers and/or practitioners do or have you collaborated with in your One Health work?
    - *If only mention fellow researchers:* Do you work with individuals from other sectors? If so, who and why?
- What drives or motivates you to collaborate with others?
- What factors influence success when those collaborations work well?
- What factors make collaborations challenging?
- What motivates or impedes you from sharing resources with others when collaborating?
- How does trust factor into collaborations in this field?
- How can collaboration help or impede One Health work?
- Are there other individuals, organizations, or disciplines you think should be included in One Health work in the future? If so, who and why?
- What factors contribute to health and safety threats in Sierra Leone? Why?
- What factors will increasingly contribute to health and safety threats in Sierra Leone in the future? Why?
- What is the role of environmental issues within the One Health construct?
- How are environmental issues connected to human and animal health?
- What are the most significant environmental issues in Sierra Leone?
- How have environmental issues (deforestation, urban development, natural disasters) impacted human and animal health?
- How do you anticipate environmental issues (deforestation, urban development, natural disasters) will impact human and animal health in the future?

- Why do you think environmental issues do (or do not) play a prominent role in One Health work?

Government agency/industry/other organizational representative

- Can you tell me a little bit about your role at [your organization]?
- What kinds of [human/animal/environmental] issues do you work on?
- What other people and organizations do you or have you collaborated with to do that work? Why or why not?
- Do you collaborate with other organizations and individuals working in different sectors? Why or why not?
    - Human? Animal? Environmental?
- What drives or motivates you to collaborate with others?
- What factors drive success when those collaborations work well?
- What factors make them challenging?
- What motivates or impedes you from sharing resources with others when collaborating?
- How does trust factor into collaborations in this field?
- How would you like to see collaboration used in your work? Are there collaborations you would like to initiate or strengthen? Why or why not?
- What factors do you think contribute to health and safety threats in Sierra Leone? Why?
- What factors do you think will increasingly contribute to health and safety threats in Sierra Leone in the future? Why?
- What environmental issues do you see in Sierra Leone?
- How do you think environmental issues (deforestation, urban development, natural disasters) have impacted human and animal health?
- How do you anticipate environmental issues (deforestation, urban development, natural disasters) to impact human and animal health in the future?
- Are you aware of One Health research and implementation?
- Are you involved? Why or why not?
- What does One Health mean to you?
    - Where does this framing come from? [Note: to get at question of if domestic, driven by external actors, etc.]

Government agencies (especially if involved with One Health):

- What drives your funding decisions around where you invest in One Health priorities?
- Which other government entities do you typically engage with around One Health work, and what motivates those engagements?
- What other entities outside of government do you typically engage with around One Health work, and what motivates those engagements?
- Who is missing from One Health conversations (agency or organization, in or outside of government), and why are they not at the table?

ALL PARTICIPANTS- Fuzzy cognitive map

We will now shift towards developing a fuzzy cognitive map, or a visual representation of connections within the overarching system connecting human, animal, and environmental health. We will work together to draw out how different groups, agencies, disease, environmental issues, and other constructs influence each other.

To make this map, we will diagram relevant issues and organizations ("concepts") and draw arrows between ones that are connected and/or influence each other. We will then assign each connection a value between -1 and +1, in increments of .25, depending on the strength of the connections and impacts.

Conclusion

That's all I have for the interview questions.

- Is there anything you would like to add?
- Do you have any recommendations of people you think would be relevant for me to reach out to for an interview on these topics?
- The second part of our study will be a focus group located at Tacugama Chimpanzee Sanctuary in mid to late April. The focus group will mainly include discussions of anonymized fuzzy cognitive maps from interviews in an effort to identify opportunities for developing and/or strengthening cross-sector collaborations. We are planning for a three-hour session. Would you be interested and willing to attend? Do you have recommendations of others who may be?

Thank you very much for your participation in our study.

Appendix F: Chapter 4 focus group script

Hi, my name is Tori Hymel I am a PhD student working with Tacugama Chimpanzee Sanctuary and my university, Virginia Tech, on a research project. We are interested in learning about your (organization, agency, etc.)'s roles in human, animal, and/or health research and practice, how you collaborate with representatives from other sectors, and how you think future, cross-sector collaborations could improve health work, both One Health-focused and more generally. We will also ask several questions about your perceptions of how your work incorporates climate change factors and what may help you to do so more effectively in the future.

The focus group is expected to take approximately 3 hours of your time. Do you have any questions before we begin? *If you have further questions or any concerns about the study, I am also happy to provide the name and contact information of my supervisor and/or research approval board at Virginia Tech.*

As per the Information Sheet you reviewed, you may withdraw from this interview at any point without adverse consequences. Are you ok with me recording our conversation?

[PROVIDED PERMISSION GRANTED, START RECORDING AND PROCEED]

- How can we ensure future collaborations are successful?
- How can we strengthen existing ones?
- Would you be willing to share resources in collaborations? Why or why not?
- How does trust factor into collaborations in this field?
- Why are collaborations important to work on human/animal/environmental health?
- What factors do you think contribute to health and safety threats in Sierra Leone? Why?
- What factors do you think will contribute to health and safety threats in Sierra Leone in the future? Why?
- How do you think environmental degradation (deforestation, urban development, natural disasters) has impacted human and animal health?
- How do you expect environmental degradation (deforestation, urban development, natural disasters) to impact human and animal health in the future?
- What potential collaborations do you think will be important for One Health work and research moving forward?
- What barriers will these collaborations face? How can we address and overcome them?
- What resources would be necessary to build more comprehensive One Health frameworks?
- Who needs to be at the table if environmental issues are to be more fully integrated into One Health work?
- What opportunities and barriers are there to broaden the tent?
- What might motivate a more holistic or comprehensive approach to One Health?

<u>Conclusion</u>
That's all I have for the focus group questions. Is there anything you would like to add? Thank you very much for your participation in our study. Please be sure to collect your travel reimbursement (200 New Sierra Leones) from me before leaving.

Appendix G: Chapter 4 complete codebook

Theme	Description	Example quote
Addressing health/safety/environmental threats		
Education	Outreach efforts aimed at spreading health, environmental, and other types of information; includes awareness raising and sensitization	*"And so Ministry of Environment is working hard to educate people. Educate people on planting trees, how the trees, educate them, tell them how the tree encourages the plants when they grow to encourages, you to have rain, you know."*
Emergency response	Capacity and structures for dealing with urgent health and safety threats	*"So anything happening, even if a pin falls here now, you will know straight off, you know, because we also have, we also have the the the this this, area to report. 1111 the 117 system. It's a it's a whole something, wherein people call and, you know, see what's happening within their comp their their their environment. And there is always a rapid response team ready for that one."*
Enforcement	Activities and practices to ensure laws and policies are being followed	*"Why is the laws are there? Though they are stringent, but not effective, they are not enforcing the laws. In other words, people keep deforesting what we are planning."*
Implementation	Putting planning efforts into practice	*"Because writing a policy is one thing, implementing it is another thing. It shouldn't be sitting on the shelves."*
Legislation/policy	Laws around management of wildlife, environment, and other human actions	*"And the the 1972, Wildlife Conservation Act, which, was, recently adopt I mean, amended in twenty twenty twenty twenty one, was it? Twenty twenty? 2022. Okay. Has some, huge effects on this, but most people are, you know, catching you know, animals from the forest and bringing them to I mean, for domestication or killing them, poaching."*
• Protected areas	Legally designated reserves or other swaths of land with regulations on resource extraction and land use	*"The the last endowment of resources or whether be it fresh water, whether be it, animals, or this could only be found in these reserves. You know? And the forest reserves are not well managed in a sense because they give license to power source, and they've been used for commercial purposes because that's their mandate to make use of these things for certain commercial purposes."*
Monitoring/surveillance	Ongoing evaluation of threats and programs	*"So we we're trying to be, let's monitor what's there. And and they have a routine system of checking it. And then and that can help to be to assure, okay. Yeah. We are safe. Nothing else is going on. Or when something is going on, you're able to pick it up."*
One Health	How the One Health framework is used in Sierra Leone	*"One of the advantage of Sierra Leone and One Health, there's collaboration at the ministerial level. All the people working are those are in those, the technical people. They are really*

		working Ministry of Health, Minister of Agriculture, Minister of Environment. There's a very good collaboration between them."
Collaboration		
Collaborations	Examples of organizations and individuals working together (including cross-sector collaborations)	*"So those are the governments and institutions, but apart from those government institutions we have local institutions, local NGOs that we are also very close and closely working with them now, like, the WHH. We are we are in working relationship with WHH. We have a lot of proposals. We have worked before, on projects."*
Collaboration drivers and barriers	What motivates organizations or individuals to work with others; what facilitates collaboration	*"No one person can get it done. No one person can get it done. So or one department can get it done. We we need, like, we need the other sectors, the expertise."*
• Capacity	Resources, manpower, ability to engage in and complete tasks; things to help develop capacity	*"So it could be a problem because different ministries, agencies, departments don't have the same capacity. There are, some, you know, government entities with very limited technical capacity or, in our own case, for example, equipment for carrying out our work."*
• Funding	Sources of money for initiating and implementing planning and action	*"Until we find a way another fund that we can we support the communities to continue, that's where we are at the moment, continue to get the forest to carry us through. So, finance, fund, is another key factor, major factor in terms of intervention."*
• Leadership	Role of individuals or organizations in charge of projects or efforts	*"Even if you bring all the resources from the developed world, if the leadership mindset is not correct, that resources, we will mismanage it. It's not it's not a problem of an individual."*
• Resource sharing	How funding, manpower, equipment, information etc. are re-allocated across boundaries	*"Well the beneficial aspect of it once it's One Health, all of you are working together, it brings unity. If there's resources, all of you are going to share, because this is One Health, it is not one individual personal property. So when the resources come, all of you, one way or the other are going to jointly implement the project."*
• Trust	Belief in the willingness and ability of others in collaborations	*"It's over time. Like, it's the execution of, projects. After project, project, after project. And I think that would be the best way I would describe it, like transparency, accountability, and demonstrated transparency and accountability over time has has contributed to the trust building."*
General challenges		
Governance challenges	Social and institutional factors that make collaboration, development, and implementation difficult	*"There's this lack of coordination. There is coordination, but there's this lack of coordination as who is to take control of these spaces."*
Sector imbalance	Disproportionate representations of various agencies and disciplines in One Health and related work	*"Because the Ministry of Health be its being a very strong institution and being, of course, having the resources in terms of human and even financial power seems to be driving the One Health. And if that happens, you will see the*

		dividends of One Health be skewed towards the health, and that will not go well for the operations of the platform."
Health and safety issues		
Climate change	Environmental impacts of climate change in Sierra Leone	*"But we also consider the manner in which the climate is changing. You have intense rain falling within a few hours. The absorptive capacity of the soil is almost now being overwhelmed."*
Disease	Illness resulting from wildlife, water contamination, etc.	*"In fact, because we are not taking care of our sanitary conditions, that is why the malaria burden is all over the place. Because the the the the substrates that the mosquitoes breed on are right on the back doors of almost 90% of the households in Sierra Leone in Freetown, to be specific. So malaria itself is number one killer disease in our country, not Ebola."*
Future threats	Environmental health and safety impacts expected to emerge or remain in the future	*"In the in the in the in the future, I think the the major threat in the future would be enforcement. The the increase in human rural urban migration, human population. Human population will actually affect the environmental health as well."*
Land degradation/deforestation	Manipulating landscape through cutting down trees, development, or other means	*"The logging, the charcoal burning, the sand mining, the quarry, the expansion of settlements. All of these are huge threats that will affect the health, our health, because definitely we can't breath fresh air when we go down all the trees."*
Mining	Resource extraction (sand, minerals, etc.)	*"I think there's a huge issue with the extent of mining, commercial mining. And I think it's not quite as well, I think the general public maybe don't realize quite how extensive, the strip mines are here."*
Livelihood impacts	How environmental and health threats negatively impact people's livelihoods (including food, housing security, poverty)	*"So even the water, we have a dam that is supplying us, constructed to supply electricity, that Congo Dam. That the water level in that area goes down, especially at this time. That's why you see, high rate of electricity rationing. So that also affects communities when there is no electricity because the water level has gone so low and they are rationing. That means the businesses that are supported by these electricity affected by this and people don't realize as much as they can."*
Natural disasters	Environmentally based events threatening health and safety	*"And so just imagine the case of the landslide that happened. I don't know if you're aware of it. Intense raining rain coming within a short period. So you can imagine the risk that it presents, not only hazard risk, but even the health of people because a lot of people get injured apart from those who get who who die in the process. A lot of properties also get damaged."*

Pollution/Sanitation	Release of harmful substances into the environment; environmental contaminants	*"I think the the I think the most important one is probably pollution. Pollution from industrial activity. Very little enforcement of regulations or sometimes we don't even know the the sources and impacts. Pollution from use of chemicals to grow more food. Food we are now Feed Salone is the main strategy. Pollution from use of some hazardous chemicals in the mining sector."*
Urban development	Expansion of city into protected areas	*"We are encroaching because I don't want to remove myself from us from that space. So we are encroaching upon the the the the Freetown protection Peninsula Area and that will not go over well for the future."*
Water	Issues with water supply and quality	*"The Freetown environmental issues is time bomb. Imagine you wake up one morning and see the dam dried overnight. And and the untoward spillover health effect will be very disastrous."*
Wildlife	Wild animal species as both threats and vulnerabilities	*"And aside that, I also have sold out the wildlife something outside because a lot of other partners, a lot of other people never knew about wildlife. In fact, people call me wildlife because I always advocate for wildlife."*
Sectors		
Agriculture	Farming, farmers, crop cultivation	*"And the catch we have is the mangrove ecology is the highest yielding ecology for us. So trying to balance between removing our farmers from the mangrove for cultivation and then providing something for them that is alternative is is is key."*
Local level	Including those at the community and individual level	*"Like the lower the lower level. Like the how would you call it? Sub-district level. So sub-sub-national level. So that's where the improvement is to be. From the national to subnational level is still good, but below that level needs to be improved."*
Private sector	For-profit businesses not controlled by the government	*"Then then the another key element out of the public sector approach, the private sectors. They are completely left out, maybe as of now."*
Research	The role of academic work in addressing health and safety threats	*"We we do have, yeah, a lot of researchers, myself. I'm, I do a lot of research with the One Health Institute at Davis, California. So, we do interact a lot with with other researchers."*
Role/background	Experience and purpose of individuals and organizations	*"I'm an epidemiologist by training. And, so I started with a little bit of clinical work. And then, majored now in public health epidemiology now. So, basically, I provide a barrel oversight of the the program, the portfolio."*

Chapter 5: General Conclusion

Summary

Chapter 1 of this dissertation outlined the use of the collaborative governance framework in environmental and wildlife governance research and practice. Organizations and other entities working in these fields often have limited access to resources like funding, manpower, and information, so collaborative governance's utility in facilitating resource sharing across various boundaries makes it beneficial (Abrams et al., 2021; Emerson & Gerlak, 2014; Lemieux et al., 2015; Schultz et al., 2019). Additionally, environmental and wildlife issues often extend across jurisdictional, geographic, and sectoral boundaries (Abrams et al., 2021; Bodin, 2017; Lemieux et al., 2015), so some degree of coordination across entities is generally required to make interventions successful. However, collaborative governance can be challenging in the environmental and wildlife contexts because of power imbalances (Abrams et al., 2021); conflicting needs and priorities (Lemieux et al., 2015); and unwillingness to participate in collaborative processes (Emerson & Gerlak, 2017). Chapter 1 concluded with an overview of how collaborative governance is or may be applied in each of the three research projects included in this dissertation.

Chapter 2 of this dissertation explored transboundary collaborations in the State Wildlife Action Plan revision process in the Southeastern United States, both generally and with regard to incorporating information about climate change adaptation. This research was timely because state agencies and other stakeholder groups are facing rapidly evolving threats and need to prepare for managing shifts in species' habitats (Armsworth et al., 2015; Martinuzzi et al., 2015; Reinhardt et al., 2020; Rezaei et al., 2023). We conducted semi-structured interviews with key stakeholders, including state agency, nongovernmental organization, federal, and tribal

representatives to see where transboundary collaboration takes place, what facilitates it, where it is needed, and challenges to implementing it. The findings highlight the critical role that regional agencies play in sharing information, building capacity, and bridging disciplinary and sector boundaries.

Chapter 3 focused on recent efforts to develop an ecotourism circuit in Sierra Leone. Specifically, we examined if and how the concerns and desired benefits of different stakeholder groups are being incorporated into planning and implementation of this initiative. Historically, tourism in developing countries has often excluded local communities (Cleveland, 2021; Harilal & Tichaawa, 2020), so we were most interested in if and how their wants and needs are being considered in the process as not doing so can have significant implications for the success and ethics of ecotourism projects (Duong et al., 2024; Gumede & Nzama, 2020). We focused on two locations where programs are being developed: Loma Mountains National Park and Jaibui Island (Condé Nast Traveler, 2023). We conducted semi-structured interviews with representatives from government agencies and nongovernmental organizations who have been involved in developing the circuit to learn about the steps they have taken and plans for these sites and in general. We also conducted semi-structured interviews with representatives from multiple communities around each tourism site to assess their knowledge of the initiative, if and how they have been involved, and any concerns they have with the ecotourism development process and its goals. Importantly, our interviews revealed underlying tensions both among communities and between communities and other stakeholder groups, especially in the Jaibui area. This finding underscores the importance of strong relationships with communities as an avenue for building trust, improving communication, and establishing shared goals.

In Chapter 4 of this dissertation, we examined the application of the One Health framework in Sierra Leone, as well as if or how different entities work across disciplinary boundaries to address environmental, human, and animal health threats. Despite their deep interconnectedness, there is a well-established imbalance in how these different forms of health are considered and addressed in One Health initiatives (Binot et al., 2015; Castañeda et al., 2024; Schurer et al., 2016). A literature review revealed a similar trend in Sierra Leone specifically; the involvement from environmental health-focused sectors like agriculture, forestry, and disaster management is minimal (Barr et al., 2019; Gbow, 2024; Suluku et al., 2018; University of Wisconsin-Madison, 2023). We conducted semi-structured interviews and held a focus group for key stakeholders in all sectors with a focus on how to strengthen transboundary collaboration to better highlight critical environmental threats facing the Freetown area, including rapid urbanization, unsustainable deforestation, and significant pollution (Cui et al., 2019; Fayiah, 2021; Larson et al., 2016).

Themes

Desired multi-stakeholder collaboration

Overwhelmingly, all three studies in this dissertation involved much discussion about the benefits of collaboration both across various government agencies and between agencies and other organizations/individuals. Interviewees spoke about how effective collaborations contribute to stronger, more comprehensive, and more adaptive plans and initiatives. Almost everyone interviewed also expressed interest in expanding and strengthening collaborations. However, interviewees in all three studies described significant challenges to these collaborations like time and effort required for communication, coordination, and building trust and relationships; desire

of entities to maintain control over plans and resources; and truly engaging all relevant stakeholders.

Broadening community level engagement

More specifically, another consistent theme in this research on collaborative governance was the need to strengthen collaborations with those at the local level, whether it be with individuals like landowners, communities, or government agencies and other entities focused on engaging those groups. While importance of doing so was consistent, interviewees in the included studies outlined a range of success in efforts. For instance, in Study 1, the West Virginia state agency representative described intensive efforts to meet with landowners and other local stakeholders throughout the state in the leadup to developing their State Wildlife Action Plan update. In contrast, interviewees in the ecotourism program- both community members and otherwise-noted frustrations for community members, especially in Jaibui, about levels of engagement, decision-making, and communication. As noted earlier in this dissertation, collaborations at this level arguably require the highest level of trust and established relationships and it will be interesting to see if prioritizing these components will contribute to more effective, less tense collaborations.

Increasing importance

These studies also revealed consistent agreement that cross-boundary collaborations are growing in importance as both environmental conditions and governance challenges grow and shift. In the SWAP study, for instance, interviewees repeatedly mentioned increasing need to collaborate across state boundaries because climate change and other threats are shifting species' habitat ranges. Additionally, in the One Health study in Sierra Leone, interviewees explained

changes the One Health platform and entities that have managed it over the years and how collaborations- successful and unsuccessful- have dictated issues and approaches to addressing them. These will be especially important moving forward with the recent establishment of the One Health Secretariat, who now formally manages the One Health platform and has a great deal of control over agencies and other organizations involved. In the case of this governance shift, the Secretariat's expressed openness to expanding cross-sector collaborations represents an opportunity for doing so more effectively and influentially.

Planning vs. implementation

A final theme that emerged in the three studies of this dissertation was the difficulty of taking both general and collaborative planning and policy and moving it into effective implementation and action. Challenges of doing so included time required for collaborations, lack of resources like funding and manpower, and a lack of clarity around roles or duplication of roles. Additionally, the shift from a mindset of resilience— maintaining historic or current ecosystem conditions— to one of adaptation—dealing with threats as they come and accepting shifts in baseline conditions— represents a major change that can be quite intimidating. These challenges represent notable points of intervention for leadership. As was established in all three studies in this dissertation, facilitative leadership that establishes conditions and sets precedent for these types of actions has great potential to positively impact the effectiveness of conservation interventions (Bryson et al., 2015; Emerson & Gerlak, 2014; Innes & Booher, 2018).

Theoretical implications

Altogether, the research conducted for this dissertation focused on use of a collaborative governance framework in three novel contexts: State Wildlife Action Plan revision processes in the Southeastern United States; ecotourism circuit development in Sierra Leone; and increasing interdisciplinarity in collaborations and health/safety threats addressed with the One Health framework in Sierra Leone. Exploring this framework in different contexts is valuable because it contributes to our general understanding of how different components are related or influenced by outside factors under different circumstances. To date, there is limited if any evidence of the use of collaborative governance frameworks in Sierra Leone, so examining its limitations, utility, and functioning in this context can contribute to informing a more robust application in the future. In this sense, this dissertation contributes to collaborative governance theory through cross-cultural validation of established framework components like the importance of trust, facilitative leadership, and resource sharing (Bryson et al., 2015; Innes & Booher, 2018).

Additionally, by studying how collaborative governance can look in practice, this dissertation contributes to how real-world processes compare to general theory, adding depth and detail to understanding of these principles and their external validity. Use of qualitative, semi-structured research methods in particular represents a contribution to collaborative governance theory because it facilitates enhanced understanding of systems and processes from multiple perspectives, as well as follow-up questions to get at the "why" of responses. For instance, this approach gave the opportunity to better understand how the formal governance structure around One Health in Sierra Leone impacts and impedes collaborative governance in this setting, a trend that doubtless holds true elsewhere and is an important general consideration of collaborative governance challenges.

Also, largely due to qualitative methods, this research was able to provide a deeper exploration of the role of perception in collaborative governance systems, a significant contribution to the theory around it. In particular, the chapters from Sierra Leone provided descriptions of collaborative processes and perceptions of system flaws from a range of participants. Expressions of frustration and other responses from those who felt they were not sufficiently included in collaborative processes— even when other stakeholders described ways they had been involved or gave reasons they had not— showed that perceived inclusion can influence how people evaluate collaborative processes and potentially impact future participation.

This dissertation also contributes to collaborative governance theory by exploring collaborative governance in the face of global change. While much research has been conducted on collaborative governance as a tool for adaptation to climate change, the literature is limited regarding other global change processes like deforestation, urbanization, pollution, and species loss. These trends are increasing and shifting, but separate from and in conjunction with climate change processes, and strategies to address them will be critical in the near future. Doing so efficiently will also be key as the future of natural resource governance and policies remains in flux, so a more complete theoretical model of collaborative governance that address these issues may be useful.

Practical implications

General

Because each study included in this dissertation was designed with conservation and professionals working directly on these topics from various fields in mind, they will each hopefully have practical implications for improving how people, organizations, and entities work

across boundaries. These studies were developed and conducted with the aim of identifying challenges, resources needed, and relationships to strengthen with the ultimate goal of improving the effectiveness of relevant collaborations in the specific study sites. The findings described here also have the potential to generalize to other settings or related topics, contributing to the use of collaborative governance in a variety of environmental and wildlife conservation issues. Most, if not all, such issues necessitate collaborations with stakeholders in a variety of sectors at a variety of scales, so research using this framework in these contexts may improve the effectiveness of a wide range of collaborative efforts.

When considering the practical implications of this dissertation, it is important to note that each study included involves or attempts to address significant environmental threats that are expected to rapidly worsen. These threats also extend beyond disciplines, impacting fields like public health, wildlife conservation, disaster response, and tourism. As such, exploring creative ways to utilize existing resources and collaborate effectively will be crucial for all organizations and individuals involved. This research provides information and evaluation of efforts to do so, again, hopefully making such work more extensive and adaptive.

State Wildlife Action Plans

The results of this study around collaborative governance as a tool for updating State Wildlife Action Plans (SWAPs) have practical implications for biodiversity conservation in the Southeastern United States and other regions where imperiled species are expected to shift across jurisdictional boundaries. Perhaps most significant was the role of regional entities, in this case organizations like the regional Associations of Fish and Wildlife Agencies (AFWAs), Climate Adaptation Science Centers (CASCs), and the Southeastern Conservation Adaptation Strategy

(SECAS). Additionally, this study revealed that these entities can be beneficial for overcoming political, resource, and other barriers, making them valuable in this context and beyond.

Ecotourism development in Sierra Leone

The work on the development in Sierra Leone underscored the challenges of developing such projects in these settings with ethical and effective community engagement. Importantly, interviews in this context highlighted that collaborations like these require an even higher level of trust and relationship building, largely due to power imbalances, communication issues, and other difficulties. This study also showed the importance of ensuring that established relationships and trust do not rest with one single individual as a plethora of logistical issues could arise and interfere with their ability to participate in the collaboration.

One Health in Sierra Leone

The final component of this dissertation, One Health in Sierra Leone, has practical implications in its potential to improve Sierra Leone's One Health research and programs. It also has great potential to generalize to One Health work in a variety of contexts and countries, providing guidance on how to understand, utilize, and strengthen both the governance component of this field more generally and cross-sector collaborations more specifically. One key result from this study was interviewees' identification of sectors and issues that will be critical to include in future One Health work, such as access to water (National Water Resources Management), pollution (Environmental Protection Agency), and local communities (communities themselves and Ministry of Local Government). Countries and regions experiencing similar human, animal, and environmental health threats would likely benefit from stronger inclusion of similar sectors and issues.

Limitations

Shifting governance conditions

One of the most notable limitations of this dissertation is the rapidly changing nature of the topics addressed. Chapter 2 focused on State Wildlife Action Plans in the United States with semi-structured interviews taking place in late 2022 and early 2023. In the time since, major political upheaval in the country has significantly disrupted wildlife conservation at the federal level, arguably making regional and state level work all the more important. However, it is not clear how disruption at the federal level has already or may continue to impact wildlife conservation at lower levels. There may be significant additional challenges in current policy and planning that were not present at the time of interviews.

Similarly, ecotourism interviews took place in Sierra Leone in early 2024, during a period when there was much excitement and planning taking place around development of the ecotourism circuit. Ecotourism was arguably more of a priority for the nonprofit organization Tacugama and other entities involved in its planning than it currently is. As interviews for Chapter 4 revealed, deforestation and land degradation, particularly in the Freetown peninsula are rapidly increasing and necessitating much time and attention from conservation organizations like Tacugama.

Semi-structured interview methodology

While there are many advantages to qualitative research methods, including semi-structured interviews, these studies relied almost exclusively on self-report data from participants. Self-report data allows for the collection of uniquely detailed information and is invaluable in capturing participants' opinions and experiences in their own words, but it can also be subject to different biases. The most relevant potential bias in these studies is social

desirability bias, which involves participants either intentionally or unintentionally shaping their responses to questions based on what answers they think researchers are looking to hear (Bergen & Labonté, 2020). The risk of this bias was particularly elevated in Studies 2 and 3 (Chapters 3 and 4) because these projects took place in partnership with Tacugama Chimpanzee Sanctuary, a known wildlife conservation entity in Sierra Leone. Tacugama had previous experience working in the sites used for this study, so participants could likely form at least a reasonable guess as to what response would fit with Tacugama's work in general. As a result, their responses may have been more pro-conservation than the reality. Additionally, the researcher's position as a white American coming in to conduct research in these settings may have added extra unintended pressure for pro-conservation responses. Another possible bias in all three studies outlined in this dissertation is recall bias, which occurs when participants misremember either objective details or their perceptions of events at the time (Sedgwick, 2012). Participants in all three studies often described events that had taken place years prior, so there was likely some recall bias in their responses.

Simplification of study systems

Finally, all three studies in this dissertation also involved varying degrees of simplification of immensely complicated systems in order to design and conduct research. Again, Studies 2 and 3 (Chapters 3 and 4) were most at risk for oversimplifying. Researchers on these projects were mostly western academics, which presents some inherent limitations for conducting research in a country like Sierra Leone. Additionally, the social-ecological systems at play in wildlife and environmental conservation in Sierra Leone are so complex and so rooted in history that it would not be possible to include and address every relevant component. Researchers made efforts to minimize exclusion of the most impactful factors such as

collaborating with organizations and individuals with more experience in the study site and utilizing semi-structured protocols to allow for follow-up questions, but these studies by no means represent every relevant social, ecological, economic, or historical condition impacting study topics.

Future research

Follow-up studies

All three projects outlined in this dissertation would benefit from follow-up research in the future, especially given the rapidly shifting threats and governance conditions in each. For instance, topics such as the collection and use of climate information, the role of regional conservation entities, changes in funding, and use of State Wildlife Action Plans covered in Study 1 (Chapter 2) would be incredibly informative to examine again. Given recent challenges to conservation work in the United States since Donald Trump took office earlier this year, re-examining these topics could give insight into opportunities for developing effective plans and governance to continue addressing wildlife and environmental conservation threats. Looking at Study 2 (Chapter 3), an ecotourism follow-up study was initially planned but did not work out because of tensions among stakeholder groups. Future research directly engaging local community members in the aftermath of delays and frustrations would provide valuable information about implications for real-world collaborative governance obstacles. Finally, Study 3 (Chapter 4) laid the groundwork for examining One Health governance in Sierra Leone. But as the One Health Secretariat was a fairly new agency at the time and their efforts to engage new stakeholders were nascent, follow-up research could evaluate interdisciplinarity how those collaborations emerge in coming years.

Alternative research methods

Because all studies outlined in this dissertation utilized qualitative research methods and analyses, they could also benefit from inclusion of other approaches to either validate or contradict results described here. Future methods could involve policy and document analysis (all studies), quantitative analyses of tourism trends (Study 2), hospital data on health impacts (Study 3), geospatial analyses of threats (Study 3), or similar methods.

Conclusion

This dissertation focused on rapidly increasing and shifting threats extending into human-animal-environmental health and safety such as climate change, deforestation, and urbanization, Additionally, it explored addressing these threats through utilization of a collaborative governance framework to engage a wide range of people involved, what makes that challenging, and what will make it more effective in initiatives of State Wildlife Action Plan updates, ecotourism development, and the One Health framework.

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