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# The Rise of Community-Based Natural Resource Management Strategies as Explained by Transaction Costs

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# The Rise of Community-Based Natural Resource Management Strategies as Explained by Transaction Costs

## Abstract

Community-based natural resource management (CBNRM) is favored over its predecessor, the fortress approach, for common pool resource (CPR) management. We strive to identify variables associated with successful CBNRM programs, and analyze whether their presence transaction costs can explain the shift in favored conservation strategy. By examining nine case studies of large mammals in Africa, we found that out of eight variables, moderate monitoring and adequate program incentives were the most critical various factors in determining CBNRM program outcomes. Furthermore, these variables, as well as others, contributed to a decrease in transaction costs.

## Keywords

CBNRM, transaction costs, SES

## Cover Page Footnote

Thank you to Mark Kanazawa at Carleton College for guiding us through the process of writing and publishing this paper.

## **Introduction**

Conservation can generally be defined as the protection of natural resources by means of sustainable use so that they “can persist for future generations.”<sup>1</sup> Modern conservation efforts date back to late 19th century America and Europe, as rapidly expanding human populations began encroaching upon wildlife. By the latter part of the 19th century, modern conservation efforts reached the developing countries of Africa.<sup>2</sup> Interest in conservation efforts stemmed largely from colonial rulers and scientists, who favored a top-down system where land was set aside for the conservation of wildlife. This method is most commonly known as the fortress approach, which is the predecessor and antithesis of the bottom-up community-based natural resource management (CBNRM) approach.<sup>3</sup>

The fortress approach is characterized by the privileging of tourists, trophy hunters, and scientists, as well as the exclusion of local peoples via patrols, fines, and fences to enforce land use regulations.<sup>4</sup> This approach is centered around the idea that the protection and promotion of biodiversity is best achieved when nature is allowed to exist in isolation, without disturbance from human activities.<sup>5</sup> Tropical ecologist John Terborgh, an avid supporter of this approach, argues that the urgency of biodiversity conservation is such that species rich areas should be protected “by whatever means necessary,”<sup>6</sup> due to the fact that human needs are often prioritized over nature.<sup>7</sup> Often, proponents of the fortress approach consider local people who have existed in an area for many generations to be “criminals, poachers, and squatters.”<sup>8</sup>

In the 1980s, the fortress approach began to fall out of favor as the primary conservation method for common pool resources (CPR), while CBNRM strategies became more widely implemented.<sup>9</sup> This transition is because the fundamental flaws with the fortress approach created a moral dilemma: the choice between

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<sup>1</sup> "Conservation," National Geographic,

<https://www.nationalgeographic.org/encyclopedia/conservation/>.

<sup>2</sup> Chetan Kumar, "Whither 'Community-Based' Conservation?," *Economic and Political Weekly* 41 (December/January 2006/2007): 5313,

[https://www.jstor.org/stable/4419076?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/4419076?seq=1#metadata_info_tab_contents).

<sup>3</sup> Kumar, "Whither 'Community-Based,'" 5313.

<sup>4</sup> Paul Robbins, ed., "Fortress Conservation," SAGE Publications, <https://sk.sagepub.com/reference/environment/n432.xml>.

<sup>5</sup> Robbins, "Fortress Conservation," SAGE Publications.

<sup>6</sup> Robbins, "Fortress Conservation," SAGE Publications.

<sup>7</sup> Robbins, "Fortress Conservation," SAGE Publications.

<sup>8</sup> Robbins, "Fortress Conservation," SAGE Publications.

<sup>9</sup> Jon Hutton, William M. Adams, and James C. Murombedzi, "Back to the Barriers? Changing Narratives in Biodiversity Conservation," *Forum for Development Studies*, January 28, 2011,341.

conservation *or* social justice.<sup>10</sup> Traditionally, the fortress approach values conservation over social justice, which results in contentious relationships between local agents and those implementing the conservation efforts. On the other hand, CBNRM strategies, in theory, address this unproductive antagonism of local communities by placing conservation and community empowerment on equal footing. This is done by giving local communities the power and responsibility to design and enforce conservation efforts.

CBNRM recognizes the connection between communities and their environments, and focuses on both the well-being of people as well as the conservation of local water, soil, and biodiversity.<sup>11</sup> This management strategy involves the establishment of decision-making bodies within communities and provides local people with the rights to their lands and resources.<sup>12</sup> Community-based approaches also create local jobs, which contribute to development goals and poverty reduction.<sup>13</sup> The success of these programs has been inconsistent, but their long-term viability seems to be connected to a combination of variables, which may be the key to designing more robust CBNRM strategies.

This study employs transaction costs to explain the shift from the fortress approach to the CBNRM approach because the presence of key variables may lower the transaction costs of conservation, therefore helping to ensure the continuation of a given CBNRM program. Transaction costs encompass all of the costs associated with making a transaction, namely costs associated with coordinating a transaction between multiple actors or costs incurred when there is a lack of trust between actors. Some common variables that can affect transaction costs include the number of involved parties, private information, property rights, and enforcement costs of property rights.<sup>14</sup> The implications of applying transaction cost theory to an analysis of conservation strategies are important because, if executed properly, CBNRM programs have the potential to benefit a lot of human and non-human communities.

The focus of this study is the transition from the traditional fortress approach to CBNRM strategies, as examined through conservation attempts of large mammals in Africa. Our analysis focuses on the region of sub-Saharan Africa, in particular the countries of Kenya, Zimbabwe, Namibia, Botswana, Zambia,

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<sup>10</sup> Asmita Kabra, "Ecological Critiques of Exclusionary Conservation," *Ecology, Economy and Society—the INSEE Journal*, January 2019, 10.

<https://ageconsearch.umn.edu/record/304020/files/EES%201-2%20009-026.pdf>.

<sup>11</sup> "Community Based Natural Resource Management," World Neighbors, <https://www.wn.org/what-we-do/community-based-natural-resources-management/>.

<sup>12</sup> US AID, *What Is Community-Based Natural Resource Management?*, 2, [https://pdf.usaid.gov/pdf\\_docs/pa00jrv1.pdf](https://pdf.usaid.gov/pdf_docs/pa00jrv1.pdf).

<sup>13</sup> US AID, *What Is Community-Based*, 2.

<sup>14</sup> Mark Kanazawa, *Natural Resources and the Environment: Economics, Law, Politics, and Institutions*

Ghana, and the Democratic Republic of the Congo. Each of these countries has implemented some iteration of a community-based conservation program in an effort to preserve various species of megafauna. We explore the shift from the traditional fortress approach to CBNRM strategies in two steps. First, we identify variables present in these CBNRM strategies that contribute to the programs' overall social and ecological success. Then, we evaluate the effects of these variables on transaction costs. Our investigation aims to address the questions: 'What variables or combinations of variables are associated with successful CBNRM programs? Can the importance of these factors and the shift from the fortress to the CBNRM approach be explained by reductions in transaction costs?'. We answer these questions by examining case studies of various CBNRM strategies in Africa, aiming to determine what elements of a program are indicative of long-term success, and evaluating whether these variables reduce the transaction costs associated with conservation.

### **Literature Review**

Elinor Ostrom, a giant in environmental economics, won the Nobel Prize in 2009 for her work in systematizing the way we understand CPR management. In her efforts to explain why some CPRs degraded and others were sustained through time, she began to identify specific factors that consistently led to the success or failures of the management of these resources.<sup>15</sup> Similarly, we hope to isolate some variables that, when present, can influence the success of CBNRM strategies. In order to better understand the nuances of successful conservation approaches, we examine case studies of various CBNRM strategies in Africa, and determine what elements of a program are indicative of long-term success or failure. Before isolating these variables, however, it is important to critically evaluate the history of the fortress and CBNRM approaches.

### **Fortress Approach**

Although the fortress approach has been utilized as a primary method of conservation for CPR in the past; however, in recent years it has been criticized for its lack of connection with local communities. These approaches are often designed and carried out by groups who are not a part of the local communities and result in strategies that are not consistent with community goals, social norms, or economic practices. Studies that examine trends in conservation policy in Africa, show that this lack of collaboration tends to foster distrust and apathy for these programs by local peoples.<sup>16</sup> One of the most direct consequences of the fortress approach is the eviction of local communities from their ancestral homes.<sup>17</sup> This displacement of

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<sup>15</sup> Kanazawa, *Natural Resources and the Environment: Economics, Law, Politics, and Institutions*

<sup>16</sup> Jon Hutton, William M. Adams, and James C. Murombedzi, "Back to the Barriers? Changing Narratives in Biodiversity Conservation," *Forum for Development Studies*, January 28, 2011, <https://www.tandfonline.com/doi/abs/10.1080/08039410.2005.9666319>.

<sup>17</sup>Hutton, Adams, and Murombedzi, "Back to the Barriers?".



various levels of co-management and revenue sharing, there is no single correct method for determining how to divide power and money, which is often a point of contention in the design of CBNRM programs. Once a design has been chosen, it is important to have clearly defined and effective institutional frameworks. This means establishing a hierarchy of authority for delegating responsibilities and holding groups accountable. Also, explicitly passing legislation and policy that supports the agreed upon framework can help with its implementation in local communities. Because these efforts transcend socioeconomic and geographic boundaries, they require collaboration. Therefore, honest and continuous communication is one of the factors that is most relevant to the success of CBNRM programs.

The success of these programs is also contingent on the capacities of the local communities to fulfill their conservation obligations. The Governance of Africa's Resource Programs is tasked with representing numerous countries, each of which contain their own diverse array of peoples who have differing needs and capabilities. In an effort to produce broadly applicable policies for an area of this size, smaller, less-developed, marginalized communities' voices are often disproportionately lost.<sup>24</sup> By definition, CBNRM programs are supposed to serve the local communities, but communities have differing levels of infrastructure and access to natural resources and human capital, which influences how much they can contribute to a conservation program.<sup>25</sup>

One critique of CBNRM is that there is high financial risk associated with these programs due to the logistical difficulties of coordinating the interests of multiple stakeholders and the limited capacities of local communities.<sup>26</sup> While CBNRM programs tend to be more inclusive than the fortress approach, the financial risks associated with failure, caused by the large initial costs of CBNRM programs, can be enough to dissuade governments, non-governmental organizations (NGOs), and private investors from partnering with local communities. Additionally, the CBNRM approach assumes that local communities are interested in preserving the at-risk wildlife.<sup>27</sup> Some communities, however, may be less inclined to protect species that they view as pests or that are irrelevant to their wellbeing (species without cultural or economic value). For this reason, CBNRM strategies may be better suited to resources that the local communities are economically dependent upon or that the local communities have a history of

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3Dcommunity%2Bbased%2Bwildlife%2Bconservation%2BAfrica&ab\_segments=0%2Fbasic\_search\_aggregated%2Ftest&refreqid=fastly-default%3A5e2f74dc8a92ac00c2a1a7c7d03381c6&seq=1#metadata\_info\_tab\_contents.

<sup>24</sup> Chevallier, "The State,".

<sup>25</sup> Chevallier, "The State,".

<sup>26</sup> Kumar, "Whither 'Community-Based,'" 5315.

<sup>27</sup> Kumar, "Whither 'Community-Based,'" 5315.

valuing culturally. These critiques fuel the overarching concern -- expressed by some conservationists, scholars, and economists -- that conservation and social development are not compatible enough to be politically and economically feasible in impoverished communities.<sup>28</sup>

### Transaction Costs

Transaction costs can provide a framework for understanding these aspects of conservation approaches, which subsequently inform the transition from the fortress approach to CBNRM strategies. Many studies have examined the historical context behind the shift in conservation paradigm from the typical fortress approach to the CBNRM approach, analyzing issues with the previous methods that make the adoption of new strategies favorable.<sup>29</sup> Transaction cost theory is underutilized as an explanatory device for the evaluation of this transition and CBNRM on the whole. Steele outlines one such example of the usefulness of transaction costs for evaluating conservation strategies, concluding that CBNRM strategies help to mitigate transaction costs by addressing issues associated with relationships between parties.<sup>30</sup> Other studies in regions such as Mongolia, Sweden and Tanzania have applied transaction cost theory to investigate the difficulties of executing successful management of natural resources.<sup>31</sup> Only a subset of this literature considers species of mammals.<sup>32</sup> Our study complements the current literature on CBNRM strategies by implementing transaction cost theory, comparing multiple case studies instead of examining only one, and privileging African mammals. We propose to identify variables inspired by the social-ecological system (SES) framework that are associated with effective programs and then apply transaction cost theory to draw conclusions about the mechanisms by which these variables influence the success of management programs. Ultimately, we employ these

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<sup>28</sup> Kumar, "Whither 'Community-Based,'" 5315.

<sup>29</sup> Kumar, "Whither 'Community-Based,'" 5315.; Anyonge-Bashir and Udoto, "Beyond Philanthropy," 67.; Chevallier, "The State,".

<sup>30</sup> Scott Steele, "An Organisational Discussion of Incomplete Contracting and Transaction Costs in Conservation Contracts," *Journal of Agricultural Economics* 61, no. 1 (February 2010): <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1477-9552.2009.00230.x>.

<sup>31</sup> Charles Meshack, "Transaction Costs of Community Based Forest Management: Empirical Evidence from Tanzania" (master's thesis, York University, 2003), 19, <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.505.9093&rep=rep1&type=pdf>; Robin Mearns, "Community, Collective Action and Common Grazing: The Case of Post-socialist Mongolia," *The Journal Development Studies*, 2007, <https://www.tandfonline.com/doi/abs/10.1080/00220389608422418>; Camilla Widmark and Camilla Sandstrom, "Transaction Costs of Institutional Change in Multiple-Use Commons: The Case of Consultations between Forestry and Reindeer Husbandry in Northern Sweden," *Journal of Environmental Policy and Planning*, 2012, <https://www.tandfonline.com/doi/full/10.1080/1523908X.2012.739298>.

<sup>32</sup> For an example, see: Widmark and Sandstrom, "Transaction Costs,"



factors to examine reduced transaction costs as a possible reason for the shift in conservation approach.

### **Economic Theory**

All natural resources can be broadly classified based on two characteristics: difficulty of exclusion and rivalry of consumption. Difficulty of exclusion is a measurement of how hard it is to regulate who gets to use a resource, while a high rivalry of consumption indicates that a resource unit used by one person cannot be used by another. CPRs such as fisheries, forests, and animal herds are characterized by both a high difficulty of exclusion and a high rivalry of consumption.<sup>33</sup> This study focuses on mammal herds in Africa, which are CPRs prone to depletion because it is more difficult to regulate people's consumption of mammal herds than other, less mobile CPRs. This dynamic can result in a situation called the Tragedy of the Commons (TOC), where actors in a system rush to consume a resource before others because it is in each individual's interest to consume as much as possible as soon as possible under the assumption that others will behave similarly. Some CPRs contain additional characteristics, including: users that act under pure profit maximization, no communication among users, no repeated interactions between users and the community, and no legal way to punish those who 'overuse'. Such a situation, first proposed by Mancur Olson, is called the Roving Bandits metaphor and typically leads to a TOC.<sup>34</sup>

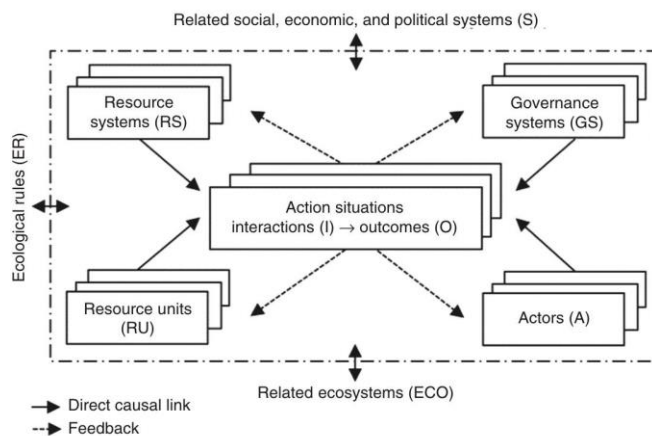
Ostrom's SES framework lays out a series of variables that have potential influence over the effective management of CPRs (Figure 1). This theoretical model considers the inherent qualities of the resources as well as the ecological, social, and government systems where they exist. One of the reasons this framework is so useful is because it addresses the ecological and social aspects of a conservation problem, which are both critical for the successful management of CPRs. For example, the migratory habits, habitat boundaries, and economic value of a resource like mammal herds are just as important to consider as the local governance system, social norms, and relations between relevant human parties. These factors, outlined by the SES framework, are inseparable from transaction costs. Therefore, when evaluating the transaction costs associated with the maintenance of a resource, the presence or absence of various social and ecological factors are necessary to consider. If local groups lack coordination and trust, even a high valuation of the resource would not necessarily be enough to save it from depletion. Similarly, if management is not economically beneficial because the resource has no market value (even if it may have significant biological value to the ecosystem), then efforts to sustain the resource will likely fail. This may be the

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<sup>33</sup> Elinor Ostrom, "The Challenge of Common-Pool Resources," *Environment: Science and Policy for Sustainable Development* 50, no. 4 (2008): 11, <https://www.tandfonline.com/doi/abs/10.3200/ENVT.50.4.8-21>.

<sup>34</sup> Kanazawa, *Natural Resources*.

case even if local groups are well coordinated and have legal agreements about how to interact with or consume the resource. In essence, the SES framework describes factors which in turn determine transaction costs for conservation strategies.



**Figure 1:** The SES Framework (Cole 2019).

The SES framework is applied to a wide variety of CPRs ranging from sustainable energy sources to more traditional examples like fisheries and forestries.<sup>35</sup> For example, overexploitation has rapidly depleted or destroyed many species used in aquaculture, which has made the protection and management of these resources an increasingly high priority.<sup>36</sup> In order to effectively manage and assess the health of these complex and dynamic systems, economists and conservationists have continuously worked to define and understand these unique resources. Due to the complex nature of these systems, no two are the same;

<sup>35</sup> Thomas Bauwens, Boris Gotchev, and Lars Holstenkamp, "What Drives the Development of Community Energy in Europe? The Case of Wind Power Cooperatives," *Energy Research & Social Science* 13 (March 2016): <https://www.sciencedirect.com/science/article/pii/S2214629615300943>; Xavier Basurto, Stefan Gelcich, and Elinor Ostrom, "The Social–ecological System Framework as a Knowledge Classificatory System for Benthic Small-scale Fisheries," *Global Environmental Change* 23, no. 6 (December 2013): <https://www.sciencedirect.com/science/article/abs/pii/S0959378013001350>; Natalie C. Ban et al., "Social and Ecological Effectiveness of Large Marine Protected Areas," *Global Environmental Change* 43 (March 2017): <https://www.sciencedirect.com/science/article/pii/S0959378017300456>; R. Arlinghaus et al., "Understanding and Managing Freshwater Recreational Fisheries as Complex Adaptive Social-Ecological Systems," *Reviews in Fisheries Science & Aquaculture* 25, no. 1 (2017): <https://www.tandfonline.com/doi/full/10.1080/23308249.2016.1209160>; Elinor Ostrom, "The Challenge of Common-Pool Resources," *Environment: Science and Policy for Sustainable Development* 50, no. 4 (2008): 11, <https://www.tandfonline.com/doi/abs/10.3200/ENVT.50.4.8-21>.

<sup>36</sup> Arlinghaus et al., "Understanding and Managing,".; Basurto, Gelcich, and Ostrom, "The Social–ecological,".

therefore, the management strategies for these systems must also be unique.<sup>37</sup> CBNRM plans are intimately connected with the theory of CPRs and applications of the SES framework because they are used to conserve resources that exist in these types of systems.

Conservation policy and research can be improved by considering transaction costs.<sup>38</sup> Particularly relevant to our analysis of CBNRM scenarios are the transaction costs associated with enforcement and interpersonal relationships. Placing local communities in control of a program can facilitate the early establishment of trust and a more equal balance of power, which is important for reducing transaction costs in complex systems that involve a multitude of parties.<sup>39</sup> CBNRM programs have potential as models for community development, poverty alleviation, and conservation. Reducing transaction costs can promote more efficient management of CPRs by incentivizing collective action.<sup>40</sup>

The SES framework provides the foundation for our experimental design by providing a list of economic and social factors that can elucidate the pathway to success for the conservation of mammal herds in Africa.<sup>41</sup> The question remains: how do we know which variables and what combinations of variables are most relevant within a particular SES? And, how do these particular variables affect transaction costs? These frameworks provide the mechanisms with which we explore the guiding question of this investigation: how can changes in transaction costs explain the historical shift in conservation strategy from the fortress approach to the community-based approach? We hypothesize that geographic and political setting, economic dependency on and value of the resource, social norms, network and leadership structure, property rights, program incentives, communication between actors, and monitoring influence transaction costs and are subsequently all relevant factors in determining the success or failure of a CBNRM program.

### **Methods**

To examine the success of CBNRM strategies, this investigation implements a qualitative analysis of nine case studies of megafauna in Africa. The

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<sup>37</sup> Elinor Ostrom, "The Challenge of Common-Pool Resources," *Environment: Science and Policy for Sustainable Development* 50, no. 4 (2008), <https://www.tandfonline.com/doi/abs/10.3200/ENVT.50.4.8-21>.

<sup>38</sup> Steele, "An Organisational Discussion of Incomplete Contracting and Transaction Costs in Conservation Contracts,".

<sup>39</sup> Fred P. Saunders, "The Promise of Common Pool Resource Theory and the Reality of Commons Projects," *International Journal of the Commons* 8, no. 2 (August 2014), <https://www.thecommonsjournal.org/articles/10.18352/ijc.477/>.

<sup>40</sup> Dora E. Carías Vega and Rodney J. Keenan, "Situating Community Forestry Enterprises within New Institutional Economic Theory: What Are the Implications for Their Organization?," *Journal of Forest Economics* 25 (December 2016), <https://www.sciencedirect.com/science/article/abs/pii/S1104689916300162>.

<sup>41</sup> Saunders, "The Promise,".

first step in this process was to identify appropriate case studies. For the purposes of this investigation, sampled studies were published after 2000 (in order to establish a sample that reflected the decades following the transition from the fortress approach to community-based strategies), focused on evaluating CBNRM strategies, determined variables that may have led to a program's success or failure, and had some indication of the program's outcome. After assembling a sample of case studies, a list of relevant factors that would be used to evaluate the case studies was created. These case studies were then classified as either successful or unsuccessful so that case studies could be compared. Factors associated with successes and failures were determined and then evaluated using a transaction cost lens to better understand the role of transaction costs in determining the outcome of CBNRMs.

The process to select criteria for examination in this study was iterative and based on Ostrom's work with the SES framework. For our purposes, Ostrom's ten design principles for self-organization, which is a major aspect of community-based resource management, were selected as a starting point. These principles include: number of actors, leadership, social norms, knowledge of SES, importance of the resource, collective choice rules, size of resource system, productivity of the system, predictability of system dynamics, and resource unit mobility.<sup>42</sup> After synthesizing information from various case studies, the first stage of variable identification was conducted. This process involved adapting Ostrom's ten design principles to make them relevant to CBNRM strategies in Sub-Saharan Africa. Variables on the initial list that were not mentioned in the case studies were removed, while several that reoccurred but were not already present in Ostrom's design principles were added. Next, factors that seemed to be operationalized in similar ways were combined. For example, geographic and political setting encapsulates both physical terrain such as accessibility and aesthetic value as well as the stability of government systems in the area. This process of synthesizing secondary SES variables was conducted periodically throughout the initial stages of the study. The final list of factors used to determine the success of CBNRM strategies included: geographic and political setting, economic dependency on and value of the resource, social norms, network and leadership structure, property rights, program incentives, communication between actors, and monitoring.

The next step in the process was to establish criteria for success and determine how to measure it. First and foremost, a successful strategy must include both ecological and social success; a CBNRM strategy that only addresses one or the other is defined here as a failure. This is because CBNRM strategies are fundamentally based on the idea that communities should be involved in and benefit

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<sup>42</sup>Harini Nagendra and Elinor Ostrom, "Applying the Social-ecological System Framework to the Diagnosis of Urban Lake Commons in Bangalore, India," *Ecology and Society* 19 (2014): <https://www.ecologyandsociety.org/vol19/iss2/art67/>; Kanazawa, *Natural Resources*.

from the conservation of their lands. A conservation plan that neglects, or harms, the community is both morally deficient and technically not a CBNRM plan, because community involvement and empowerment are tenets of the CBNRM approach and is the principal reason it has and continues to come into favor as the preferred conservation strategy.<sup>43</sup> Similarly, a plan that only benefits the community (financially, socially, etc.) and disregards local conservation issues also does not qualify as a CBNRM program because it does not effectively protect the area's natural resources. Therefore, both ecological success and social success must be present in order to consider any CBNRM strategy successful.

Before conservation programs can be classified as either successful or unsuccessful, definitions for ecological and social success must be established. We will consider ecological success to be the stabilization of local ecosystem conditions within the first couple years of the program and a bettering of local conditions in the long run. Whether success is measured by the growth of vegetation, the stabilization of animal populations, or the improvement of biodiversity will vary depending on the location and goals of the program. Most of these metrics of ecological success can be measured over time using quantitative measures (counting, tracking, computer-generated models); however, if a program is just beginning or does not have the resources necessary to gather data, it will be hard to measure ecological success. In these cases, a long-term plan to quantify the area's ecological changes as well as local observations documenting the improvement of ecological conditions sufficed. Social success can be more variable and difficult to quantify than ecological success. Examples of social success include community organizing, increased income, the development of new sectors of local economies, or the achievement of various community or policy initiatives. Records of interviews, surveys, and observations of the local economy and infrastructure projects were used when evaluating various measures of social success.

After the definition of a successful program was established, case studies were designated as either successful or unsuccessful and tabulated. Factors relevant for this study were scored on a scale from -1 to 1, with the exception of monitoring, which was designated only as either -1 or 1 (omitting zero) to indicate harmful or beneficial monitoring practices respectively, where harmful could be excessive monitoring or no monitoring at all (for more information refer to Table 1). For all other variables, an integer score from -1 to 1 was designated, where -1 was indicative of failure, 0 was neutral, and 1 was indicative of success. These scores represent how a factor contributed to the overall long-term ecological and social effectiveness a CBNRM program. For example, variables that were relevant to the geographic and political setting score included population density, infrastructure, political scene, terrain, weather, soil profile, distinctive scenery, distance between

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<sup>43</sup>Kumar, "Whither 'Community-Based,'" 5315.

managing parties and the resource, and accessibility. A geographic and political setting with a score of 1 indicates that the geographic area and political environment of the region was described as being conducive to the management of that resource and aided in the success of the overall program. However, a score of -1 for geographic and political setting would indicate that the geographic area or political environment has features that limit the accessibility or desirability of the resource that would hinder the long-term viability of a CBNRM strategy.

These scores were used in two ways. Firstly, this scoring system was designed to be additive so that a cumulative score could be calculated for each case study. In this manner, individual variable scores that would inhibit the success of a program subtract from the cumulative score for that case study, whereas individual scores that would facilitate the success of a program add to the overall score. The middle score, 0, plays an equally important role by representing factors that were neither beneficial nor harmful to the local community's management efforts. These cumulative scores were not used in the transaction cost analysis. Rather, they were used to calculate an average score for successful and unsuccessful case studies (Table 1). The fact that the average cumulative score for successful case studies is distinct from the average cumulative score for unsuccessful case studies supports the idea that our variables of interest are relevant to the way that we are defining success and failure for case studies. Secondly, all scores for a certain variable were compared to the corresponding outcome of a case study. This comparison helped elucidate whether or not there is a pattern between the score of a variable and the outcomes of the case studies. Higher correlations indicated that a variable was more relevant to the program outcome. For example, the program incentives variable was deemed to be a highly relevant factor because positive scores for this variable were always correlated with a success whereas negatives were always correlated with a failure (Table 1).

Following the designation of case study outcomes and the tabulation of their scores, an analysis of the relationship between factors and transaction cost was conducted. As evidenced in many of our case studies, the conditions of a variable that were evaluated as a score of positive 1 correspond to a decrease in transaction costs which, we believe, provides for the implementation and maintenance of successful CBNRM programs.

### **Results**

The case studies under examination were located in various countries throughout Africa. In Kenya, there is the Kenya Wildlife Service (KWS).<sup>44</sup> Zimbabwe has the Communal Areas Management Programme for Indigenous

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<sup>44</sup> John Mburu and Regina Birner, "Emergence, Adoption, and Implementation of Collaborative Wildlife Management or Wildlife Partnerships in Kenya: A Look at Conditions for Success," *Society & Natural Resources*, 2007, <https://www.tandfonline.com/doi/full/10.1080/08941920701211645>.

Resources (CAMPFIRE).<sup>45</sup> In Namibia, case studies focused on the Torra Conservancy and the Namibia Community Conservancy Model.<sup>46</sup> The Chobe Enclave Community Trust (CECT) is located in Botswana, as is the Sankuyo Tshwaragano Management Trust (STMT), which is located in the extreme eastern fringe of the eastern Okavango Delta of Botswana.<sup>47</sup> The case study examined in Zambia was the Administrative Management Design for Game Management Areas (ADMADE).<sup>48</sup> The Wechiau Community Hippo Sanctuary (WCHS) is located in Ghana.<sup>49</sup> And finally, in the Bolobo territory of the Democratic Republic of the Congo, the Congolese NGO Mbou-Mon-Tour (MMT) founded a bonobo conservation project.<sup>50</sup> These case studies and a summary of their scores for each variable are presented in Table 1.

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<sup>45</sup> Peter J. Balint and Judith Mashinya, "The Decline of a Model Community-based Conservation Project: Governance, Capacity, and Devolution in Mahenye, Zimbabwe," *Geoforum* 37, no. 5 (September 2006):

<https://reader.elsevier.com/reader/sd/pii/S0016718505001351?token=BCFA12D1952EC7E2D2EA25AE2F924B781DD0754A70BC91476D41FA168C498AD42A3827742F89D199F32C69F00DBF0E16>.

<sup>46</sup> Lauren J. Scanlon and Christian A. Kull, "Untangling the Links Between Wildlife Benefits and Community Based Conservation at Torra Conservancy, Namibia," *Development Southern Africa*, 2009, , <https://christiankull.files.wordpress.com/2011/03/scanlon-kull-2009-authors-version.pdf> ; Chevallier, "The State,".

<sup>47</sup> Joyce Lepetu, Richard OB Makopondo, and Michael BK Darkoh, "Community-Based Natural Resource Management and Tourism Partnership in Botswana: Which Way Forward?," *Botswana Notes and Records* 39 (2008):

[https://www.jstor.org/stable/41236638?Search=yes&resultItemClick=true&searchText=Community+Based+Natural+Resource+Management+program+Mbaiwa&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3DCommunity%2BBased%2BNatural%2BResource%2BManagement%2Bprogram%2Bmbaiwa&ab\\_segments=0%2Fbasic\\_search\\_solr\\_cloud%2Fcontrol&refreqid=fastly-default%3A36b367d6b96b0f9f5f44f47fealed7f1&seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/41236638?Search=yes&resultItemClick=true&searchText=Community+Based+Natural+Resource+Management+program+Mbaiwa&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3DCommunity%2BBased%2BNatural%2BResource%2BManagement%2Bprogram%2Bmbaiwa&ab_segments=0%2Fbasic_search_solr_cloud%2Fcontrol&refreqid=fastly-default%3A36b367d6b96b0f9f5f44f47fealed7f1&seq=1#metadata_info_tab_contents).

<sup>48</sup> Stuart A. Marks, "Back to the Future: Some Unintended Consequences of Zambia's Community-Based Wildlife Program (ADMADE)," *Africa Today*, Spring 2001,

[https://www.jstor.org/stable/4187393?Search=yes&resultItemClick=true&searchText=munyamadzi+game+management+area&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dmunyamadzi%2Bgame%2Bmanagement%2Barea&ab\\_segments=0%2Fbasic\\_search\\_solr\\_cloud%2Fcontrol&refreqid=fastly-default%3Ac699c2817b68678c2e926ee9decb78d&seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/4187393?Search=yes&resultItemClick=true&searchText=munyamadzi+game+management+area&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dmunyamadzi%2Bgame%2Bmanagement%2Barea&ab_segments=0%2Fbasic_search_solr_cloud%2Fcontrol&refreqid=fastly-default%3Ac699c2817b68678c2e926ee9decb78d&seq=1#metadata_info_tab_contents).

<sup>49</sup> Donna J. Sheppard et al., "Ten years of Adaptive Community-governed Conservation: Evaluating Biodiversity Protection and Poverty Alleviation in a West African Hippopotamus Reserve," *Environmental Conservation* 37 (September 2010),

[https://www.jstor.org/stable/44519981?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/44519981?seq=1#metadata_info_tab_contents).

<sup>50</sup> Victor Narat et al., "Bonobo Conservation as a Means for Local Development: An Innovative Local Initiative of Community-based Conservation in the Democratic Republic of the Congo," *Primateology* 4, no. 2 (2015), <http://dx.doi.org/10.4172/2167-6801.1000127>.

**Table 1:** Summary of CBNRM Case Studies (-1 is not suitable for success, 0 is neutral or marginally suitable, 1 is most suitable). The average total score (calculated by summing the values assigned for each variable) for successful case studies was 5.7, and the average score for unsuccessful case studies was -4.3.

\*For monitoring, either too little or too much monitoring would not be suitable for success. Therefore, monitoring has a designation of -1 or 1, where -1 is not suitable (too little or too much monitoring) and 1 is suitable (moderate monitoring).

Case Study	Geographic and Political Setting	Econ. Depend.	Social Norms	Leadership Network	Property Rights	Communication	Monitoring*	Program Incentives	Outcome
Kenya Wildlife Service (KWS)	1	0	0	1	0	1	1	1	Success
Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)	-1	0	-1	-1	-1	-1	-1	-1	Failure
Torra Conservancy	-1	1	1	1	1	1	1	1	Success
Namibia Community Conservancy	1	1	1	1	1	0	1	1	Success
Chobe Enclave Community Trust (CECT)	1	1	0	0	-1	0	-1	-1	Failure
Sankuyo Tshwaragano Management Trust (STMT)	1	1	0	1	0	1	1	1	Success
Administrative Management Design for Game Management Areas (ADMAGE)	0	0	-1	0	-1	-1	-1	-1	Failure
Wechiau Community Hippo Sanctuary (WCHS)	0	0	1	1	0	1	1	1	Success
Mbou-Mon-Tour (MMT)	0	-1	1	1	1	1	1	1	Success



### **Geographic and Political Setting**

Geographic and political setting can be important for the success of a CBNRM in several ways. Terrain and infrastructure, which facilitate tourism and aesthetic value, can make or break conservation efforts in a particular area. For example, the CECT is in a region of Botswana where there is a lack of diverse scenic regions and insufficient infrastructure, which decreases accessibility to wildlife regions and impedes efforts to capitalize on foreign visitors.<sup>51</sup> On the other hand, the STMT, in the Okavango Delta, has a prime geographic location for tourism because the program is situated in proximity to villages and has a local landscape that encourages ecotourism.<sup>52</sup> The Torra Conservancy in Namibia has favorable geographic-specific factors including low population density and well-established infrastructure; furthermore, the semiarid and arid areas with rugged mountains and suboptimal rainfall make agricultural endeavors unfavorable which lowers the opportunity cost of creating conservation areas because agriculture is not a feasible alternative.<sup>53</sup> Namibia also has low population density, high soil aridity, and scarce water which would favor conservation over agriculture, as do some of its other traits, including distinctive and attractive scenery, well established infrastructure, and high accessibility for regional and international visitors.<sup>54</sup>

The opportunity cost of converting the land into conservation areas can be so critical that it can determine the willingness of local people to participate in a project. In Ghana, the WCHS was located on land where the residents had lived pastorally and where agriculture was feasible.<sup>55</sup> These land use alternatives made ecotourism ventures more controversial and therefore less effective. In the Democratic Republic of the Congo, however, local people initiated the MMT project and chose where to place protected forests based on their own knowledge of the area; these forests often had flourishing bonobo populations and were areas where human activity was not a priority.<sup>56</sup> In situations where there are not desirable land use alternatives, there are lower transaction costs associated with convincing locals to participate in conservation programs. These benefits extend beyond the initial formation of agreements, because they facilitate honest communication and enthusiasm throughout the duration of the program.

### **Economic Dependency on and Value of the Resource**

Economic dependency is defined as having a substantial proportion of employment or village revenue come from the resource and its associated revenue streams. The economic dependency of local communities on mammal populations

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<sup>51</sup>Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

<sup>52</sup>Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

<sup>53</sup>Scanlon and Kull, "Untangling the Links."

<sup>54</sup>Chevallier, "The State," 18.

<sup>55</sup>Sheppard et al., "Ten years."

<sup>56</sup>Narat et al., "Bonobo Conservation," 6.

for ecotourism can help encourage them to participate in conservation strategies. In the KWS and WCHS, ecotourism was a significant and valuable aspect of the economy for local peoples.<sup>57</sup> The river safaris of the WCHS program have been incredibly successful.<sup>58</sup> The program has encouraged an interest in hippopotami and the areas in which they live, and tourists have sponsored both scholarships and schools in the region.<sup>59</sup> Bolstering the local community in these ways is not just beneficial, but critical in sustaining and improving the community's standards of living. These results foster trusting relationships between local communities and governmental institutions as well as foreign parties, which in turn lower transaction costs associated with the maintenance of conservation programs. In Botswana, local communities that were important to the success of the CECT and the STMT were also economically dependent on ecotourism.<sup>60</sup> People working with the STMT relied on formal employment in tourist facilities for their livelihoods.<sup>61</sup> Similarly, those working with the CECT credited the wildlife for bringing the tourism that contributed to a significant part of their income stream.<sup>62</sup> In Namibia, the steadily increasing income for local people and the \$300,000 Namibian dollar annual contribution resulting from the Torra Conservancy also demonstrates economic dependency.<sup>63</sup>

### **Social Norms**

Social norms are any customs that influence the way a local community interacts with the resource under consideration. The implementation of a conservation program was often more successful in situations where local communities did not exhibit consumptive practices when engaging with natural resources due to social norms. In the Democratic Republic of the Congo, local communities in Bolobo did not depend on bonobo populations economically; however, they did place significant cultural value on these mammals. The MMT created educational campaigns and used broadcasts to reinforce traditional bonobo-eating taboos and to "remind people that custom, national and international laws forbid killing bonobos."<sup>64</sup> There was a similar dynamic in the WCHS, where hippopotami were treated with gratitude and admiration because of their cultural significance.<sup>65</sup> Namibia is another example where conservation of megafauna is well aligned with cultural practices.<sup>66</sup> Even before contemporary CBNRM

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<sup>57</sup> Mburu and Birner, "Emergence, Adoption," 384.; Sheppard et al., "Ten years," 279.

<sup>58</sup> Sheppard et al., "Ten years," 275.

<sup>59</sup> Sheppard et al., "Ten years," 276.

<sup>60</sup> Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> Scanlon and Kull, "Untangling the Links," 10.

<sup>64</sup> Narat et al., "Bonobo Conservation," 5.

<sup>65</sup> Ibid.

<sup>66</sup> Scanlon and Kull, "Untangling the Links."

programs became popular, local communities understood the economic benefits associated with ecotourism.<sup>67</sup> In both Botswana programs, the CECT and STMT, the same was true: conservation was compatible with their local cultural practices due to their prior establishment as tourist hubs.<sup>68</sup> Therefore, securing enthusiastic local participation was a more straightforward process than it would have been for communities that hunt mammal populations, resulting in lower transaction costs.

On the other hand, if the wildlife that needed protecting was viewed as a pest -- like in Zambia, where elephants would destroy crop fields -- the conservation thereof was more challenging because it required a change in the relationship between local human and animal populations.<sup>69</sup> The strict preservation demanded from the ADMADE did not match the norms of the Zambian people, as hunting was an essential part of their regular nutrition.<sup>70</sup> In situations like this, the transaction costs associated with establishing a conservation program that relies on local participation are much higher because it necessitates a change in the lifestyle of local communities.

### **Network and Leadership Structure**

Having clearly defined responsibilities and a system of accountability for leadership helps CBNRM strategies be more effective in reaching community and conservation goals because they promote more efficient delegation of responsibilities and increase trust in the program. The MMT has an inclusive and positive management structure where all parties work together to determine what strategy is best for the communities.<sup>71</sup> CECT in Botswana is a legally constituted community-based organization with a Board of Trust, Village Trust Committees, Village Group Committees, and Family Groups.<sup>72</sup> They have a comprehensive array of representatives from different social levels, however, the system is not perfect.<sup>73</sup> For example, the Board of Trust ultimately lacks authority as evidenced by the fact that they do not have the power to set a hunting quota.<sup>74</sup> STMT has a ten-member board with five men and five women who are selected every two years.<sup>75</sup> They have partnered with several other private safari businesses that help them reach community goals.<sup>76</sup> For the WCHS, just leadership is very important because there are 17 villages containing people of a variety of ethnic groups, but

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<sup>67</sup> Ibid.

<sup>68</sup> Lepetu, Makopondo, and Darkoh, "Community-Based Natural," .

<sup>69</sup> Marks, "Back to the Future."

<sup>70</sup> Ibid.

<sup>71</sup> Narat et al., "Bonobo Conservation."

<sup>72</sup> Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

<sup>73</sup> Ibid.

<sup>74</sup> Ibid.

<sup>75</sup> Ibid.

<sup>76</sup> Ibid.

all of the chiefs are from a majority ethnic group.<sup>77</sup> Even so, the chiefs did not give in to any implicit pressure to prioritize their people, which supported the integrity of the program.<sup>78</sup> The chiefs retained formal land ownership, but villagers were able to use the land as if they owned it.<sup>79</sup> As a part of the management structure, chiefs interact with the government and NGOs to coordinate conservation and community empowerment efforts.<sup>80</sup> There was also a sanctuary management board that comprehensively represented constituents in the decision making process.<sup>81</sup> Ultimately, important decisions were made at the village level. The Namibia Community Conservation Model did not have a middleman between communities and the private sectors which streamlined their operations significantly.<sup>82</sup> The program also had an active network of NGOs that continuously championed and provided technical assistance to the conservation program as well as a relatively low level of institutional corruption.<sup>83</sup>

On the other hand, benefits of the CAMPFIRE project have shifted almost exclusively to those in management positions.<sup>84</sup> Many Zimbabwean residents complained of “bad management, corruption, nepotism, and intimidation” within CAMPFIRE, which exacerbated the lack of solidarity in the various local communities.<sup>85</sup> CAMPFIRE was viewed as a program that served community leaders and their families, not the community itself. Many people directed fear, anger, and resignation towards those in charge.<sup>86</sup> Similarly, the ADMADE in Zambia was a wildlife-centered, top-down program that lacked transparency and accountability.<sup>87</sup> Furthermore, their recruitment strategy was based on loyalty rather than ability, which exacerbated poor social relations.<sup>88</sup> In general, leadership plays a critical role in CBNRM programs by establishing an efficient system and confidence in conservation and community empowerment efforts. When leadership is corrupt or incompetent, poor community relations increase the transaction costs associated with running the conservation program.

### **Property Rights**

Giving the local community a vested interest in the conservation program by allowing them to retain at least some of the property rights to the natural resource

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<sup>77</sup> Sheppard et al., "Ten years."

<sup>78</sup> Ibid.

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Chevallier, "The State."

<sup>83</sup> Ibid.

<sup>84</sup> Balint and Mashinya, "The Decline," 810.

<sup>85</sup> Ibid.

<sup>86</sup> Ibid.

<sup>87</sup> Marks, "Back to the Future."

<sup>88</sup> Ibid.

can help ensure the long-term success of a CBNRM. This feature of a conservation plan helps reduce transaction costs by giving local communities a compelling reason to collaborate. Furthermore, local groups typically have a more nuanced understanding of native wildlife that can make them more effective stewards of the land than outsiders. This is demonstrated by the WCHS in Ghana, where the chiefs retained land ownership, but villagers had property rights: they were able to live and interact with the landscape as if it were their own.<sup>89</sup> For example, they were allowed to facilitate the inception of an organic shea nut collective, which became a successful economic endeavor.<sup>90</sup> In Namibia, the Torra Conservancy property consisted of land that was traditionally owned by the national government.<sup>91</sup> The conservancy created communal, state owned lands where people from local communities were able to farm or graze their livestock.<sup>92</sup> However, rights to the wildlife were restricted unless you were a part of the Torra Conservancy.<sup>93</sup> For the Namibia Community Conservancy, rights that were granted to the community were broad, and although conditional, were not term limited.<sup>94</sup> The government gave residents the rights to communal areas: local people were allowed to hunt protected species, capture and sell game, and trophy hunt.<sup>95</sup>

In Zambia, the locals did not receive any property rights from the ADMADE program.<sup>96</sup> The same was true of the CECT, where the community had very little management authority.<sup>97</sup> The lack of property rights in these two areas contributed to the insufficient nutrition and motivation for local peoples to continue cooperating with the conservation programs.

### **Program Incentives**

There are a variety of incentives that can affect the local population's willingness to participate in a CBNRM program. The types of incentives discussed in this section differ from social benefits that stem from certain social norms, economic benefits associated with the value of the resource itself, and benefits derived from resource use. Program incentives can be financial in nature, but come directly from the program and not from any inherent characteristic of the resource being conserved. In the STMT program in Botswana, each of the involved villages received a portion of the revenue, and in some years the elderly receive allowances from the programs as well.<sup>98</sup> They were also promised investments and

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<sup>89</sup> Sheppard et al., "Ten years."

<sup>90</sup> Ibid.

<sup>91</sup> Scanlon and Kull, "Untangling the Links."

<sup>92</sup> Ibid.

<sup>93</sup> Ibid.

<sup>94</sup> Chevallier, "The State."

<sup>95</sup> Ibid.

<sup>96</sup> Marks, "Back to the Future."

<sup>97</sup> Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

<sup>98</sup> Ibid.

development programs.<sup>99</sup> The board members were paid per board meeting, which incentivized ongoing communication.<sup>100</sup> Similarly, CECT leadership split 85 percent of the earnings between the five neighboring villages, which helped demonstrate the program's worth to the local communities.<sup>101</sup> Over the course of five years, the Torra spent \$1.2 million Namibian dollars providing benefits to members.<sup>102</sup> In 2003, a \$630 dividend was distributed to adult members, which is roughly equivalent to a month's wages.<sup>103</sup> Furthermore, the community was allowed to harvest limited amounts of game for meat, which was then distributed twice annually.<sup>104</sup> Elders of the community have also received Christmas packages, which mainly included textile goods.<sup>105</sup> Over the course of 10 years, the WCHS raised approximately \$48,000 (USD) from ecotourism.<sup>106</sup> In addition, 20 full time jobs, over 100 part-time jobs, and between 30 and 40 commissioned positions such as tour guides or boatmen were created within the hippopotami sanctuary.<sup>107</sup>

ADMADE lacked such incentives for local participation and the same could be said for CAMPFIRE, where economic benefits were concentrated in the leadership, and the general population was excluded from profit-sharing.<sup>108</sup> Like with other factors relevant to the success of CBNRM strategies, incentives can lower transaction costs by increasing the willingness of certain parties to participate in conservation efforts. This is typically done through the facilitation of community empowerment via economic benefits like job creation and monetary compensation. When this is lacking, participation in these programs by local peoples is unlikely to occur, as evidenced by CAMPFIRE. When interviewed, a local woman expressed uninterest and distrust in the program by stating, "It's for them [the program managers and community leaders], not for us."<sup>109</sup>

### **Communication Between Actors**

Another important factor in determining the effective implementation and maintenance of CBNRM programs is honest and ongoing communication between all actors. STMT was successful, in part, because they had weekly board meetings.<sup>110</sup> They also involved the community in decisions about both wildlife

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<sup>99</sup> Ibid.

<sup>100</sup> Ibid.

<sup>101</sup> Ibid.

<sup>102</sup> Scanlon and Kull, "Untangling the Links."

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

<sup>106</sup> Sheppard et al., "Ten years."

<sup>107</sup> Ibid.

<sup>108</sup> Marks, "Back to the Future."; Balint and Mashinya, "The Decline," 811.

<sup>109</sup> Balint and Mashinya, "The Decline," 810.

<sup>110</sup> Lepetu, Makopondo, and Darkoh, "Community-Based Natural."

management and local tourism.<sup>111</sup> Additionally, board members met with residents of the villages once a month for a report on progress, which allowed them to remain updated on the needs and capabilities of the local communities.<sup>112</sup> The Torra conservancy held an annual general meeting where each member of the conservancy was encouraged to attend.<sup>113</sup> The elected committee members met quarterly to discuss the distribution of that term's profits.<sup>114</sup> Ongoing and honest communication like this is an effective way to mitigate transaction costs, which tend to be borne from the deficient relationship between relevant parties.

The ADMADE program, on the other hand, lacked transparency and communities were kept in the dark about how much money was generated from the program and how the funds would be used, which fueled distrust and contempt of the program by local people.<sup>115</sup>

### **Monitoring and Enforcement**

Unlike the previously mentioned factors, monitoring and enforcement can be detrimental to CBNRM strategies when carried out with either too much or too little fervor. Many successful CBNRM programs provided communities with enough enforcement to hold local people accountable while still deterring illegal activities. The rules of enforcement must be agreed upon within the local community for monitoring to be productive and feasible. This is demonstrated in several of the case studies. The bonobo conservation initiative led by MMT had quite strict monitoring rules, as well as a trial system where people would be penalized if they were caught in protected areas.<sup>116</sup> However, villagers and traditional chiefs chose the rules inside the protected forests and these rules were allowed to develop in accordance with the evolution of the project.<sup>117</sup> Similarly, WCHS had strong monitoring and enforcement policies.<sup>118</sup> The riparian areas along the shores of the river were designated as 'core zones', where no humans were allowed to intrude.<sup>119</sup> There were rangers to enforce this rule, as well as community bylaws to effect punishments.<sup>120</sup> Likewise, in Namibia, the Torra Conservancy assigned guards to deter people from harming, or illegally taking wildlife.<sup>121</sup>

In certain situations, overly strict monitoring and enforcement policies can drive hunting practices underground. Zambia had incredibly strict monitoring and

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<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

<sup>113</sup> Scanlon and Kull, "Untangling the Links."

<sup>114</sup> Ibid.

<sup>115</sup> Marks, "Back to the Future."

<sup>116</sup> Narat et al., "Bonobo Conservation," 8.

<sup>117</sup> Ibid.

<sup>118</sup> Sheppard et al., "Ten years."

<sup>119</sup> Ibid.

<sup>120</sup> Ibid.

<sup>121</sup> Scanlon and Kull, "Untangling the Links."

enforcement, chiefly in the form of village scouts that would patrol residential areas and check people's cooking pots for meat.<sup>122</sup> The leadership network employed spies and used reward systems for information, which led to corruption and bribery.<sup>123</sup> They would also prosecute farmers who defended their crops against elephant raids.<sup>124</sup> These restrictions increased social tensions and drove hunting practices underground.<sup>125</sup> This degradation of trust increased the transaction costs associated with local and institutional collaboration. Wildlife infraction arrests are hypothesized to decrease when programs like these are implemented, however, in this case they went up, which is one way to demonstrate that monitoring failed to achieve its purpose.<sup>126</sup>

### **Discussion**

While there are various factors at play in these CBNRM systems, those that we found to be important for success are: geographic and political setting, economic dependency on and value of the resource, social norms, network and leadership structure, property rights, program incentives, communication between actors, and monitoring (Table 1). The long-term feasibility of these strategies depends on their ability to yield results regarding the improvement of local ecological conditions as well as the standards of living for local villages. The factors listed above play significant roles in the accomplishment of both of these goals. They should therefore be considered when creating policies that are designed to produce efficient, long-term benefits.

In practice this recommendation means several things. First, CBNRM strategies should target particular resources. Conservation sites that are physically close and accessible to the local communities that will be tasked with managing them are more favorable than those that are not. The resources on these sites should also be valuable enough that local communities are dependent upon their presence for maintaining a certain quality of life, or would otherwise be invested in their long-term conservation. Second, CBNRM strategies should aim to promote practices that are as similar as possible to the previous activities of local communities, because dramatically changing the way of life for an entire populace can create tension between the local community and the conservation program. Third, CBNRM strategies must have a clearly defined and accountable authority system that maintains continuous communication with the smaller groups actually tasked with carrying out the provisions of the strategy. Lastly, in order for a CBNRM strategy to be robust in the long-term, ongoing monitoring of the resource must be incentivized, especially by giving the local communities enough of the

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<sup>122</sup> Marks, "Back to the Future."

<sup>123</sup> Ibid.

<sup>124</sup> Ibid.

<sup>125</sup> Ibid.

<sup>126</sup> Ibid.



associated property rights so that it is worthwhile to abide by and enforce the provisions of the management plan.

Several of the variables that we have identified as important for the success of CBNRM strategies demonstrate why community-based efforts might be more conducive to lower transaction costs than the traditional fortress approach. For example, the geographic location of a program is important because in a CBNRM program, actors who control and run the conservation program are often much closer to the resource they are managing, which facilitates more effective information sharing and more intimate ecological knowledge of the resource. In regard to information sharing, accountable local leadership tends to be more reliable when it comes to maintaining open channels of communication with local communities. When dealing with the fortress approach, on the other hand, local communities are often neither consulted nor informed of the necessary developments, pitting local communities against the conservation program. Such lack of transparency inhibits effective and long-lasting decision making by degrading trust between parties. In a community-based approach where the rules of the conservation program are created and updated by the community or its representatives, private information and distrust are less prevalent, and transaction costs are lower. As a result, both human and non-human populations benefit. High enforcement costs, which was one of the primary concerns of the fortress approach because it required strict physical boundaries to conservation areas, are not a central concern with CBNRMs. This characteristic CBNRMs is especially valuable when dealing with highly mobile resources like African mammals. In community-based approaches, monitoring is less necessary because the locals are incentivized to work with the conservation program rather than against it, as it is linked to the wellbeing of their communities rather than being placed in opposition to it.

Ultimately, understanding why there has been a shift from the fortress approach to the CBNRM approach will help inform both international and local communities as they continue to design increasingly practical, effective, and sustainable conservation strategies for a variety of natural and societal conditions. Due to their fundamental significance in various exchanges, understanding the mechanics of transaction costs is a valuable exercise. Transaction costs are present everywhere. They influence mundane interactions between individuals as well as critical decisions between nations. Studying transaction costs and better understanding their effects and how they influence the operation of a conservation program will help people to organize and run complicated, unique and dynamic programs like the conservation ventures described above. Furthermore, identifying sets of important factors in the SES framework is useful for the conservation of a variety of CPRs from mammal herds and fisheries, to lakes and mineral deposits because these variables can be used to develop an understanding of the specific characteristics relevant to a certain conservation program. Beyond that, several of

the dynamics outlined by the framework that describe aspects of a system such as network and leadership structure as well as communication between actors can be extrapolated for use in facilitating smoother transactions in fields outside of conservation. In this day of global connectivity, the need to coordinate with multiple and diverse groups across cultures and legal systems is not uncommon.

### Conclusion

While this investigation does reveal important insights, it also has limitations. First and foremost, the analysis in this study is based on a sample of only nine case studies, which limits our ability to assign statistical significance to any quantitative results. As we have mentioned before, Africa is a large and diverse place, and no single method of conservation will work throughout the entire region. In order to gain a better understanding of the ways in which various factors influence CBNRM, more case studies should be undertaken that explore a wider range of human and non-human ecosystems. There are also limitations inherent in the way that we classified and assigned values to variables. Economic dependency and monitoring in particular were difficult to define specifically and were not always explicitly mentioned in case studies that we examined. In these instances, we used the information that was provided in the studies to infer the impact of certain factors on the success of the program. Where there was not enough detail regarding certain factors to do this analysis, we assigned a value of zero, assuming that the lack of information about said factor implied that it did not have a significant effect on the outcome of the program. This practice, although not ideal, allowed for the comparison of case studies across factors.

In African CBNRM programs, we identified the following eight variables as relevant to the success of conservation and social development efforts: geographic and political setting, economic dependency on and value of the resource, social norms, network and leadership structure, property rights, program incentives, communication between actors, and monitoring. Through our analysis of nine case studies, we found that clearly defined and accountable leadership was critical for the success of CBNRM programs (all successful case studies had a score of 1 for leadership; Table 1). On the other hand, a lack of property rights was indicative of failed CBNRM programs (all unsuccessful case studies had a score of -1 for property rights; Table 1). Both a moderate level of monitoring as well as program incentives were important for characterizing both successful and unsuccessful programs (all successful case studies had a score of 1, while all unsuccessful case studies had a score of -1 for monitoring and program incentives; Table 1). Due to the clearly demarcated scores of 1 and -1 of each of these variables for successful and unsuccessful case studies, these two characteristics are the most critical factors in determining the outcome of a CBNRM program targeting mammals in Africa. Moving forward, it is imperative that these variables are considered in future CBNRM plans, as their correct implementation can reduce

transaction costs in such a way that ensures the long-term feasibility and success of these programs.

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