



Assessing Community-Based Wildlife Conservation Programs with the Gross National Happiness Framework

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Abstract

Many wildlife conservation projects aim to create sustainable and effective solutions by incorporating human and community well-being into their projects. While a few of these projects are incorporating a community well-being approach based on non-economic factors such as health, education, culture, community vitality, and good governance, most define well-being in purely economic terms. Often, the goal is equitable sharing of the economic value of wildlife as the primary incentive for communities to conserve wildlife. However, these projects have had variable results due to a variety of factors. The question of how conservation projects can reliably and consistently improve both community well-being and wildlife outcomes has yet to be answered. The authors posit that existing indices that measure well-being such as the government of Bhutan's Gross National Happiness (GNH) index, can provide a framework to systematically identify well-being factors through a community-driven method. In this article, nine sustainable and successful community-based wildlife conservation projects are assessed to determine what aspects of well-being (as described by the nine domains of Bhutan's GNH framework) were considered in project planning and implementation. The results indicate that each project did incorporate a variety of aspects of human well-being into planning and implementation, which likely contributed to their success. Future research recommendations include the development and testing of a community-based well-being instrument to analyze and guide community-based wildlife conservation programs.

Keywords Well-being · Community-based wildlife conservation · Gross National Happiness · Community engagement

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Introduction

Pressures on wildlife and natural habitats are increasing, leading to a global situation in which, for many wildlife species and many habitats “challenges are growing causing a dramatic decline of wildlife populations” (Kideghesho and Rija 2018, p. 2). At the same time levels of happiness and satisfaction with life are low or declining in many nations and levels of negative affect increasing (Helliwell et al. 2019). There is mounting evidence that healthy habitats and robust wildlife contribute to individual and community well-being (Bell et al. 2018; Allgood et al. 2014). The wildlife conservation field over time has evolved to attempt to incorporate community well-being needs into projects (Dressler et al. 2010). Incorporating community engagement and improving community well-being can help conservation projects communicate, understand, incorporate, and value community members and their input (Berkes 2004; Delgado-Serrano 2017) and community input helps to identify and prioritize community well-being needs so that meaningful incentives for support of conservation can be built into initiatives (Berkes 2004). However, successfully conserving wildlife while simultaneously improving community well-being has proven to be an elusive achievement (Dressler et al. 2010). In this essay, we propose that existing human well-being indices such as Bhutan’s Gross National Happiness can be used to assess the impact of community-based wildlife conservation projects.

An International Context for Well-Being and Its Application to Community-Based Wildlife Conservation

Bhutan pioneered efforts to create wider measures of well-being with its Gross National Happiness (GNH) philosophy in 1972 (Musikanski 2014). Bhutan’s government established a GNH Commission tasked with assessing proposed national policies through this framework in order to determine their potential impact on the well-being of the population. In 2008, they began to measure GNH with a GNH index (Ura et al. 2012). While the Gross Domestic Product (GDP) measures only economic activity (Costanza et al. 2009), the GNH index assesses nine domains or circumstances of life (Ura et al. 2012). GNH equally weighs the domains of (1) community vitality, (2) cultural diversity, (3) ecological resilience, (4) education, (5) good governance, (6) health, (7) living standard, (8) psychological well-being, and (9) time use, and as such, is a holistic measure of well-being (Ura et al. 2012) (Table 1).

Bhutan’s GNH has led to the application of well-being frameworks at the international level. In 2011, the United Nations (UN) General Assembly passed Resolution 65/309, *Happiness: Towards a holistic approach to development*, encouraging member nations to measure their citizens’ happiness and well-being, and to use that measure to help guide public policies (United Nations General Assembly 2011). This was followed in 2012 by a UN high-level meeting on happiness and well-being, chaired by Prime Minister Jigmi Y. Thinley of Bhutan (Royal Government of Bhutan 2012). The Organization for Economic Cooperation and Development (OECD) also set an international precedent in 2013 by issuing the *Guidelines on Measuring Subjective Well-being* and definitively determining that well-being can be measured (OECD 2013). The OECD report, *How Was Life? Global Well-being since 1820* notes that societies are

Table 1 Bhutan's gross national happiness domains

Domain name	Description
Community Vitality	Evaluates donations of time and money, community relationships, social support, family, safety, and pride in the community.
Cultural Diversity and Resilience	Evaluates cultural participation, speaking the native language, tradition, religion, and artistic skills.
Ecological Resilience	Evaluates ecological issues, environmental responsibility, wildlife conflict or the absence of, pollution, and urbanization issues.
Education	Evaluates holistic schooling, literacy, knowledge, and certifications.
Good Governance	Evaluates government performance, fundamental rights, government services, political participation, and political freedom.
Health	Evaluates mental health, including depression and anxiety, self-reported health and nutrition status, number of healthy days, and long-term disability.
Living Standards	Evaluates assets, housing quality, and household income.
Psychological Well-being	Evaluates life satisfaction, positive emotions, negative emotions, and spirituality.
Time Use	Evaluates the balance between paid work, unpaid work, leisure, and sleep, as well as the flexibility of working life.

richer, healthier, and better educated than they were nearly two centuries ago, but inequality and violence are consistent problems in many areas and environmental damage is mounting (van Zanden et al. 2014).

The benefits of measuring and enacting policies that consider all of the factors that impact community well-being are becoming well understood among international development organizations like the UN and OECD. More local, regional, national, and international measures of well-being are being proposed and adopted (Abdallah et al. 2012; McGuire et al. 2012; Lawn 2003; Musikanski and Polley 2016). At the same time, efforts are underway to lift levels of well-being at national levels, as exemplified by the *Global Happiness and Well-being Policy Reports* (Global Happiness Council 2018, 2019), and at the community development level (Lee et al. 2015). The proliferation of these measures of well-being suggest that wildlife conservation projects should incorporate well-being measurement into their projects in order to assess the project's effect on well-being.

Wildlife Conservation Trends and their Impact on Communities and Wildlife Conservation Projects

Fortress Conservation

Conservation efforts began by excluding or limiting activity in large areas. In the nineteenth century, U.S. preservationist John Muir was instrumental in setting the minimization of human activity as a major goal of conservation projects in the U.S. (Westover 2016). Prompted by the conservationist movement, President Theodore Roosevelt set aside approximately 230 million acres of public land for conservation

(National Park Service 2017). Since then, the global conservation establishment has created a plethora of protected areas worldwide. Fifteen percent of the Earth's landmass is now considered protected (Jones et al. 2018).

These are remarkable achievements for conservationists, but the success has not come without costs. The protected areas range from strict nature reserves to managed resource areas and they permit varying degrees of human activity, usually limited to sustainable use of a protected area's resources (Bruner et al. 2001). Significant amounts of protected land have historically been devoted to exclusionary fortress conservation (Wilshusen et al. 2002), which is based on the belief that the best way to protect biodiversity is to fully isolate wilderness from humans under the assumption that all local and traditional land-uses contribute to biodiversity loss and degradation of the environment (Brockington 2002). This approach to conservation creates tensions between local communities and conservationists that can ultimately harm the well-being of the community while impeding the effectiveness of conservation efforts (Dowe 2011).

In the National Park systems of the U.S., a long record of exclusionary conservation and forceful relocation of Native Americans caused great misery for decades (Pearce 2011). In central Africa, research demonstrates that certain communities have also been negatively affected by fortress-style conservation efforts (Kangalawe and Noe 2012; Ayari and Coussel 2017). Some conservation practitioners did not adequately work with indigenous communities living on protected lands to ensure that livelihoods and culture were preserved or communities were fairly compensated (Brockington 2002; Halladay and Gilmour 1995), which, in some cases, has led to conflict between indigenous communities and conservation personnel (Kangalawe and Noe 2012). The 2018 World Happiness Report showed that areas where there is conflict have the lowest levels of satisfaction with life compared to any other area (Helliwell, Layard & Sachs 2018). The exclusion of local communities from access to the wilderness and wildlife they rely upon harms their well-being in other ways. It often leads to a loss of local knowledge and traditions and sense of culture. Many communities that relied upon the wilderness were invested spiritually and practically in sustaining the long term health of the ecosystem and habitat, and when they are cut off from it, that connection is lost. Thus, it can be said that fortress conservation that separates communities from the ecological systems they rely upon does not address the root causes of detrimental wildlife resource utilization and eventually leads to community hardship (Bulte and Rondeau 2007). Due in part to the detriments on community well-being that fortress conservation can cause, wildlife conservation efforts have changed, for the most part, to include consideration for the communities adjacent to, still residing in, or otherwise utilizing lands protected for wildlife conservation (Hulme and Murphree 2002).

Integrated Conservation and Development Projects

Integrated conservation and development projects (ICDPs), developed in the late twentieth century, are approaches that leverage socio-economic tools to incentivize wildlife conservation or disincentive unsustainable activities while improving social development priorities. (Alpert 1996; Hughes and Flintan 2001, pp. 4–6). Often,

economic compensation is awarded to communities that engage in conservation activities in the form of benefit sharing, alternative livelihood developments, and development activities such as building schools, roads, and hospitals (Hughes and Flintan 2001, pp. 4–6). This approach can be seen as aligned with the United Nations Development Programme (UNDP), where human development factors are defined as “improving people’s lives...giving people more freedom and opportunities to live lives they value” and “providing opportunities” (United Nations Development Programme 2019, pp. 3–6).

However, there are many problems with projects that compensate or incentivize communities and individuals primarily through an economic basis. Disproportionately high benefits can accrue to those in power rather than to the community members who live in closest proximity to wildlife (Brockington 2002). Financial incentives, particularly the small-scale incentives most conservation organizations provide, can also contribute to power imbalances and a downward spiral of exploitation of the vulnerable (Spencer and Spender 2016).

Additionally, economic incentives based on replacement costs for resources, recreational value, or ecosystem services often cannot compete with short-term alternatives that have more lucrative economic benefits. (Hackel 1999). Economic incentives also do not account for important well-being factors, such as cultural, educational, psychological, spiritual factors as well as a sense of community, connection, stability, and many other aspects of well-being that cannot be measured by money or financial incentives (Allgood et al. 2014). One time or small financial incentives are unlikely to keep up with the economic burdens placed on these communities by the effects of climate change and other environmental disasters (McShane and Wells 2004). Furthermore, the use of financial incentives without regard for all the factors that contribute to well-being can result in the shifting of a community’s culture from caring about the environment and each other to caring about financial wealth, status, and appearance at the expense of the environment, community, and happiness (Kasser 2002; Kasser and Ryan 1993).

People value more than financial rewards (Kubiszewski 2014). Research has demonstrated that well-being consists of many different factors and economics is just one of them (Organisation for Economic Cooperation and Development 2013). To achieve overall well-being, basic needs must be met, including the provision of water, food, shelter, and safety (Maslow 1943). These needs could be met in most communities by financial means; however, other needs must be met for well-being, such as healthy relationships, sense of community, cultural connection, and sense of heritage (Berkes 2004; Milner-Gulland et al. 2014). These aspects of well-being are not easily compensated by financial means.

There are many successful examples of conservation projects incorporating economic and human development goals (Pringle 2017; Verner and Kronik 2010; Smith 2014). However, incorporating development goals does not always lead to intended outcomes and can lack a strong connection between development interventions and conservation outcomes (Buach et al. 2014; Hughes and Flintan 2001, pp. 7–9) or even favor development over conservation (Hackel 1999; Delgado-Serrano 2017). Regardless, the trend has brought to focus the need to include human development indicators and involve local communities in conservation initiatives.

Community-Based Conservation

Mirroring the development of IDCs, in the last four decades, many conservation practitioners have shifted to approaches that incorporate various levels of community-based involvement (Campbell and Vainio-Mattila 2003; Delgado-Serrano 2017). Economist Elinor Ostrom demonstrated that the tragedy of the commons theorized by Hardin (1968) could be avoided if, among other conditions, local community members are included (Ostrom 1990). Hardin (1968) argued that individuals acting in their own self-interest would result in the depletion of shared resources and ultimately make everyone involved worse-off. However, Ostrom (1990) demonstrated that common resources can be shared effectively if certain conditions are met. These conditions were outlined in her eight design principles for common resource institution and notably highlighted the inclusion of local interests in all stages of resource management. Ostrom (1990) emphasized the appropriation of decision-making and enforcement regarding resource conservation to the local community in which those most closely tied to a resource participate most in determining its distribution. This approach underscores the value of local government participation and the inclusion of a community-based approach in sustainable resource conservation. In Ostrom's framework, the presence of democratic and transparent local management that represents the interests of the community directly impacts the success of resource conservation efforts. Accordingly, conservationists have developed approaches including community-based conservation (CBC) and community-based natural resource management (CBNRM) which aim to put the governance of natural resources (including wildlife and other biodiversity) into the hands of local communities (Berkes 2004; Dressler et al. 2010; Shackleton et al. 2010).

The Case for a Well-Being Framework for Community-Based Wildlife Conservation

Based on the proliferation of models such as IDCs, CBC, and CBNRM, wildlife conservation is clearly shifting from a narrow focus on species and ecosystem to include community engagement and considerations of the people that live closest to the wildlife. Contrasting the philosophies of wildlife ecologist Aldo Leopold and wildlife preservationist John Muir, Goralnik and Nelson (2011), found that the conservation of nature requires that “we must acknowledge our wider community, accept our role within it, and then act on its behalf” (p. 191). This is reflected in a wider recognition by Bekoff (2013) that the success of conservation hinges on whether its practitioners can learn about ‘how human attitudes are formed, maintained, and changed for the better.’ (Bekoff 2013, p.xvii). Many wildlife conservation projects that combine human development approaches and/or community engagement with conservation have achieved positive results, however, many have also failed (Shackleton et al. 2010; Buach et al. 2014; Delgado-Serrano 2017). Replicability and sustainability continue to present challenges (Dressler et al. 2010). Achieving a structured approach for addressing the intersection of community well-being and conservation is therefore needed. This structured approach, in the authors opinion, should encompass well-being indicators to measure and guide the effectiveness and sustainability of community-based conservation.

Allgood et al. (2014) reviewed various alternative indicator systems that encompassed social, economic and environmental factors and their connections to wildlife and found that Bhutan's Gross National Happiness (GNH) Index to be a suitably holistic indicator set composed on a broad set of indicators. They used the GNH framework to analyze how animals contribute to human well-being. They reviewed peer-reviewed research and reviewed effective and sustainable community-based wildlife conservation programs to analyse ways that animals contribute to human well-being, with well-being defined and organized by the GNH framework. The case studies included both conservation of wildlife and animal welfare of domestic and farm animals. Allgood et al.'s (2014) analysis suggests a link between conservation of wildlife and human well-being in many of the GNH domains.

Investigation into the Relevance of GNH Framework for Community-Based Wildlife Conservation Projects

In light of Allgood et al.'s (2014) analysis the authors investigated nine wildlife conservation projects to explore the relevance of GNH to community well-being in wildlife conservation projects. The projects were chosen based on the following criteria: (1) The wildlife conservation outcomes were effective and sustainable, (2) there was community engagement at some or all stages of the projects, (3) some aspect of community well-being was improved and (4) data was available. The nine projects are named according to the country in which they were conducted: Botswana, India, Indonesia, Malawi, Mexico, Mozambique, Rwanda, Tanzania (Kilombero), and Tanzania (Mbeya). The project in Botswana established an education program in a remote village outside of the Okavango Delta to provide experiential education in conservation and wildlife while boosting self-confidence and overall test scores. The project in India helped fishermen and the local government near a critical whale shark nursery employ fishing methods that helped protect whale sharks instead of intentionally or unintentionally catching them. The project in Indonesia worked with villagers to establish sustainable farming techniques and provide affordable health care in order to prevent illegal logging of orangutan habitat. The project in Malawi dramatically cut human-wildlife conflict by building a water pump and electric fence while also helping villagers establish sustainable agriculture. In Mexico, community members established conservation easements in order to protect a lagoon and surrounding area that is a gray whale nursery, migratory bird sanctuary, and an important source of fish. The project in Mozambique established a sustainable tourism industry in Gorongosa National Park in partnership with local government and with local communities. The project in Rwanda provides experiential conservation and health education to local schoolchildren, improving health and coexistence with mountain gorillas. The project in Kilombero, Tanzania is helping small-scale farmers to use sustainable and wildlife friendly farming practices. The project in Mbeya, Tanzania is also helping farmers establish sustainable farming practices while also helping the farmers establish and monitor land use plans that maintain water quality and protect ecologically sensitive areas,

Obtaining Data on Projects

Primary contacts for each of the projects were identified and contacted by personal communication. Each of the primary contacts were high level managers of the projects with knowledge of the history, planning process, data, as well as had access to employees and community members. Each of the nine primary contacts were emailed a questionnaire (Appendix II) which was promptly filled out and returned to the authors. The questionnaire prompted the contacts to answer questions about the history and status of the project, the project's community engagement, and overall sustainability. Additionally, the questionnaire included questions about how economic and non-economic factors have changed since the project started and if they were included and planning. The questionnaire also included a short set of questions that the primary manager could ask one to three community members. The primary contacts were also asked to provide any additional documentation including planning documents, surveys, and status reviews. In three of the nine projects, the project managers were unable to provide responses from community members: Mexico, Mozambique, Tanzania (Mbeya).

Summarizing Data for Analysis

Structured summaries (Appendix I) of each project were composed based on questionnaire responses, personal communication with project contacts, and additional documentation provided by project contacts. The summary describes how each project involved the community; explored the ways in which the case study's incorporated indicators in the nine GNH domains in planning; and evaluated the impact on well-being of each case study based on the indicators in each of the nine domains.

Scoring the GNH Domains

Each project was scored for each GNH domain based on two categories: whether or not each domain was considered in planning (considered in planning) and how well the project improved or maintained indicators in that domain (results). For considered in planning, projects were scored on a yes (=1) or no (=0) basis (Table 2). For results, projects were scored on a zero through three basis with 0 = unknown, or unsatisfactory; 1 = slight increase or remained satisfactory; 2 = moderate increase or remained good; and 3 = substantial increase or remained excellent (Table 3). Each GNH domain was assessed a score for both the considered in planning category and the results category by aggregating the individual domain score of each case study together. These scores were converted to percentages for each domain using the total possible score for each of the categories. For considered in planning, nine was the maximum score. High scores indicated that a given domain and associated indicators were planned for and considered by a larger share of the cases studies. For results, the maximum score for a domain is 27. To find the percentage, the total score was divided by 27. A high score for a given domain indicates that a large share of the projects saw positive change or maintained positive indicators for that domain.

Table 2 Total score and percentage of total for considered in planning for each of the nine domains

G N H domain	Ecological resilience	Standard of living	Health	Education	G o o d governance	Community vitality	Psychological well-being	Cultural resilience	diversity and use	Time
<i>Considered in planning</i>										
Rwanda	1	1	1	1	0	1	0	0	0	0
Malawi	1	1	1	1	0	1	0	0	0	1
Indonesia	1	1	1	1	0	0	0	0	0	1
India	1	0	0	0	0	1	1	1	1	0
Kilombero	1	1	0	0	1	0	0	0	0	0
Mbeya	1	1	0	0	1	0	0	0	0	0
Mexico	1	1	0	1	1	0	0	0	0	0
Botswana	1	1	0	1	1	1	1	1	1	0
Mozambique	1	1	1	1	0	1	0	0	0	0
Total	9	8	4	6	4	5	2	2	2	2
Percentage	100 %	89 %	44 %	67 %	44 %	56 %	22 %	22 %	22 %	22 %

Table 3 Total score and percentage of total for results for each of the nine domains

G N H domain	Ecological resilience	Standard of living	Health	Education	G o d governance	Community vitality	Psychological well-being	Cultural resilience	diversity and use
<i>Results</i>									
Rwanda	2	2	3	3	0	3	1	1	0
Malawi	3	3	3	2	1	3	1	0	3
Indonesia	3	3	3	2	1	1	2	1	2
India	3	0	0	0	1	3	1	2	0
Kilombero	3	3	1	1	2	2	0	0	0
Mbeya	3	3	2	2	3	1	2	2	0
Mexico	3	3	2	2	3	3	1	2	0
Botswana	2	1	0	3	2	2	3	1	0
Mozambique	3	3	3	3	1	2	1	0	0
Total	25	21	17	18	14	20	12	9	5
Percentage	93%	78%	63%	67%	52%	74%	44%	33%	19%

Results of Investigation into the Relevance of GNH Framework for Community-Based Wildlife Conservation Projects

How Often Each GNH Domain was Considered in Planning (Table 2)

All nine projects incorporated environmental and wildlife indicators into their planning, with ecological diversity and resilience scoring the maximum nine points. Most projects included factors found in the Human Development Index (United Nations Development Programme 2019), which, for the purposes of this paper, are indicators in the standard of living, health, and education domains in planning (eight, four, and six projects respectively). Eight out of the nine projects included at least one of these three domains in planning. Four projects included all three of these domains. The good governance and community vitality domains were included in planning frequently, with four and five projects including their indicators in planning respectively. Two of the projects included indicators in both of these domains, while only one did not include either of them. The three remaining domains, psychological well-being, cultural diversity and resilience, and time use, were not included in planning as frequently, with only four of the projects including at least one of them in planning. Two projects included both psychological well-being and cultural diversity and resilience in planning while another two included time use.

Scores for Each GNH Domain in the Results Category (Table 3)

All nine projects posted positive scores for ecological diversity and resilience. The domain received 25 or 93% of the possible 27 points available. Seven of the nine projects exhibited great increases or maintained high levels of indicators in this domain. The classic development domains (standard of living, health, and education) received relatively high scores with 21, 16, and 18 respectively. Additionally, community vitality received a score of 20, a relatively high figure, especially considering that only five projects explicitly planned for indicators in the domain. Good governance and psychological well-being received moderate scores, with 14 and 12 respectively. Cultural diversity and resilience and time use received the lowest scores, nine and five respectively.

The Relevance of GNH in Community-Based Wildlife Conservation Projects by Domain

Nine projects were assessed to understand the degree to which holistic measures of community well-being (as described by the nine domains in Bhutan's GNH framework) were improved or considered in planning. Through this assessment, the frequency in which each GNH domain was used in planning or improved through the projects was then tabulated and analyzed.

Ecological Diversity and Resilience Domain

The ecological diversity and resilience domain was included in planning by every project, and nearly every project demonstrated high achievement for this domain. These

results were expected given that positive conservation outcomes were a criteria for choosing the projects. However, it is important to note that each case study's positive change in environmental indicators was the result of a change in behavior by the community. For example, in Indonesia, community members stopped illegal logging because they were able to learn sustainable farming techniques and were provided affordable medical care, reducing the drivers of illegal logging. In Malawi, members of the community stopped entering the park to hunt and fish illegally and switched to fish farming in the village in fish ponds to support their families.

It is also important to note that the only two projects (Rwanda and Botswana) that did not post the maximum score for ecological diversity and resilience results are focused primarily on education and may not be measuring environmental or wildlife changes, or will not see such changes until the targets of the project (school children) are of age to make a difference in their communities.

Standard of Living, Health, and Education Domains

Of the three human development domains (standard of living, health, and education), standard of living was subject to the most substantial planning and had excellent, well reported results. Eight of the nine projects received 21 of the total 27 points for results. Health and education were often explicitly included in planning but were less frequently included than standard of living. This is likely due to some projects focusing on education or health domains to the exclusion of the other.

However, even if a project is focused primarily on one domain, it does not mean that the project cannot incorporate planning and interventions related to another. In other words, an education-based project, for instance, can still incorporate health indicators and interventions and may find greater success doing so. Incorporating a comprehensive measure of well-being such as the GNH index into planning may help a project incorporate additional aspect of well-being into planning and implementation.

Community Vitality Domain

Community vitality was included in planning by five of the nine projects. However, every project saw positive results for this domain, which led to a high score of 20 out of 27. Additionally, a project that planned for community vitality was more likely to have better results (all five of these projects had moderate to excellent results in community vitality).

Some of the projects specifically measured changes in community vitality. For example, the Malawi project monitored attitudes toward wildlife and the environment before and after the initial interventions. In India, fishermen's attitudes toward whale sharks moved from that of a product to that of a valued part of the ecosystem, both ecologically and spiritually.

The fact that all of the projects saw positive results in the community vitality domain, regardless of whether it was planned, underscores its importance to the success and sustainability of community-based conservation projects. Even if the case study's implementers were not explicitly mentioning it, they integrated community vitality considerations into their interventions. Using a comprehensive human well-being index such as GNH may help future projects surface important

factors that aid in the effectiveness and sustainability project that may not be initially apparent. It may also allow conservation planners to incorporate community vitality into planning and implementation.

Good Governance, Psychological Well-Being, Cultural Diversity and Resilience, and Time Use Domains

The four domains of good governance, psychological well-being, cultural diversity and resilience, and time use had the lowest scores and the lowest percentages of projects that explicitly included them in planning. However, there was at least one case study that explicitly incorporated each one of them. These projects either saw large improvements in that specific domain or integrated what was already a strong domain in the community as an asset to implementation. In each of these cases, the incorporation of these domains directly led to excellent conservation outcomes and project sustainability.

The Mexico project found that there was little to no land use governance within the area before the project, which was partially responsible for poor water quality and erosion affecting a lagoon that is a vital gray whale nursery. The project helped the community create a land use map and associated policies which together formed an equitable and sustainable governance tool that is transparent and driven by community members. This governance tool is a clear improvement in the good governance domain and has directly led to better land use decisions that have protected water quality and reduced erosion. The community-led nature of the governance tool is likely a prominent factor in the project's sustainability.

The Botswana project included psychological well-being as a key indicator in their education-focused interventions. The project's comprehensive education programs are intended to boost the school children's self confidence in addition to teaching them about conservation. The project implementers placed equal value on improving the psychological well-being of the school children and improving test scores as they worked toward achieving a conservation mindset within Gudigwa Village. This approach has resulted in significant improvements in both test scores and attitudes towards conservation and wildlife.

The whale shark project in India explicitly incorporated the strong religious culture of the fishing communities as a factor in project planning. One of the project's main strategies was to partner with religious leaders so that they could engage the community in learning about the importance of the whale sharks to their coastal lands and livelihoods. Working within the existing culture (the cultural diversity and resilience domain) has helped the project to achieve strong wildlife conservation outcomes and attain remarkable longevity and sustainability.

The Malawi project identified improving time use as a key objective to improving human well-being in the community. One of the primary interventions was building a water pump inside the village so that water gatherers (who are primarily women and children) did not have to spend several dangerous hours every day traveling back and forth to the river to obtain water. Besides eliminating frequent wildlife (and human) conflicts, the time saved by the women and girls

allows them to participate in other activities, such as educational programs for the girls, which are known to improve a host of other community and individual well-being factors (Sen 1999). Understanding how interventions can improve time use can be an important factor in community-based wildlife conservation projects.

Limitations

The nine projects are not intended to be a representative sample of wildlife-conservation projects. The authors only included successful projects that, while geographically and topically diverse, are inherently biased by what projects the authors have access to.

Synopsis of GNH Domain Investigation

We examined how nine community-based wildlife conservation projects incorporated components of human well-being into project planning and implementation, using the GNH index to define well-being. Results show that the projects universally planned for indicators within the ecological diversity and resilience domain and achieved excellent results for those indicators. Additionally, the projects frequently planned for and achieved positive results for indicators in domains that are typically associated with sustainable development: standard of living, education, and health. The remaining four domains, community vitality, good governance, psychological well-being, cultural diversity and resilience, and time use, were less frequently explicitly included in planning, but several of the projects provided examples of how incorporating each of them in planning and implementation led to positive conservation outcomes and project sustainability.

These projects are examples of successfully linking conservation and community well-being in order to create positive and sustainable change for people, wildlife, and the environment. Analysis shows that the projects incorporated one or more non-traditional factors into planning and implementation that are not often measured or included in standard sustainable development or conservation portfolios. Standard measures of success in conservation of development may have overlooked these potentially vital factors. Incorporating an established well-being framework such as the GNH into planning and implementation may lead to improved conservation results.

The projects as a group also demonstrate the advantage of a community-based approach for every step of a project, from design, to planning, to implementation. The radical listening in Indonesia and the participatory community engagement in Malawi were two examples of structured community engagement that helped elucidate some of the indicators or factors spread across the nine domains that needed to be addressed with the project. In Mexico and in Tanzania (Mbeya), project implementers introduced water and land resource governance structures, but turned to the community members themselves to implement the projects and govern the process.

Recommendations and Future Research

A structured approach for addressing the intersection of community well-being and conservation is needed. By using a holistic framework like GNH to inform the development of a structured, community-led plan for a wildlife conservation intervention, project planners can surface the vital, but sometimes hard to ascertain, culturally relevant well-being factors which can be essential to the success of any intervention. We believe adopting such methods will result in more efficient and effective impacts for wildlife and community members.

Additionally, well-being assessments can provide a key data set for program evaluation. Use of pre, interim, and post intervention well-being assessment provides the opportunity to assess impacts on communities at the onset and for the duration, and (if relevant) termination of a project. These insights can enable decision-making for mid-course corrections when needed, and provide evidence of important project outcomes.

Future research recommendations include the development and testing of a well-being instrument to analyze the well-being of a community that is organized around the GNH domains, or other human well-being index such as the UN's Sustainable Development Goals (SDGs). Future research could test the viability of such an instrument.

Compliance with Ethical Standards Statement

There are no conflicts of interests. All relevant ethical standards were observed.

Appendix I

Rwanda – Conservation Heritage - Turambe

Near Volcanoes National Park

Contact: Valerie Akurasendenge, Conservation Heritage - Turambe

Short Description:

One of several NGO's working in the gorilla habitat, Conservation Heritage – Turambe (CHT) works with communities living near Volcanoes National Park in northwestern Rwanda. The location of these parks is of high conservation concern due to the presence of mountain gorillas and the highly diverse habitat across three countries (Rwanda, DRC, and Uganda).

Problem:

Gorillas are Critically Endangered due to habitat loss and poaching. The local communities are poor and rely on resources collected from the protected areas and agriculture. Communities encroach on gorilla habitat in order to farm and collect resources resulting in human-wildlife conflict and habitat loss.

Solution:

CHT aims to reduce human conflict with gorillas and encroachment into their habitat by improving community livelihoods through conservation and health education of schoolchildren and other means. CHT works with 200 schoolchildren every year providing conservation and health class sessions.

Community Member Involvement:

Rwandan community members have been involved in CHT from the beginning. CHT collaborates closely with local leaders and the Rwandan Development Board. School directors and teachers have also taken lessons to heart and show ownership of health and conservation projects such as tree planting, kitchen gardens, and environmental clubs.

Human Wellbeing:

Ecological Diversity and Resilience: Through CHT's education programs, communities learn about gorillas and their habitat and the importance of living in harmony with them. Surveys conducted in 2016 show a 23% increase in agreement that mountain gorillas play an important role in the ecosystem and a 34% increase in understanding why the gorillas are important to the community. The expectation is that by understanding the importance of gorillas and their habitat, extractive and harmful practices will occur less.

Standard of Living: It is apparent that CHT has helped improve living standards by ensuring the protection of one of the largest job creators in Rwanda: eco-tourism. The CHT director said that CHT "creates opportunities for the community to raise their own income" citing eco-tourism, cultural tourism, and other alternative income sources such as the sheep project. This reduces the reliance on resource extraction and destructive agriculture expansion.

Health: Before implementation of the project, many community members, especially schoolchildren, exhibited poor hygiene, particularly a lack of hand washing and dental hygiene. Survey data taken three years after the implementation of the project show an overall increase in hygienic behaviors including hand washing, bathing, and keeping a clean home.

Education: Before implementation of the project, there was regular education for schoolchildren but the curricula did not include conservation and there was a lack of understanding of what conservation or conservation education means. The CHT director has noticed a clear increase in understanding of conservation education and its benefits among school directors, teachers, local leaders, and other community members through annual events and through increased recognition and partnership requests by local schools.

Good Governance: Not addressed by the project and it is unclear whether governance has changed at all.

Community Vitality: The CHT director identified a lack of community interest in conservation before the project. However, as more community members learned about the benefits of a healthy gorilla population and habitat, they started to take pride in it. The community now feels a sense of excitement and pride over the gorillas and the importance of park protection and its role in their daily lives. Survey data taken three years after project implementation show a 23% increase in agreement that mountain gorillas play an important role in the ecosystem and a 34% increase in understanding why the gorillas are important to the community.

Psychological Wellbeing: Poverty causes low psychological wellbeing. The improved standard of living from the project interventions likely leads to improved psychological wellbeing.

Cultural Diversity and Resilience: Not addressed and it is unclear whether local customs and traditions were part of or incorporated in to the program. However, since

nearly all CHT employees including the director are Rwandan, there is an automatic connection to the communities.

Time Use: Not addressed and it is unclear whether time use has changed.

Sustainability and Effectiveness:

The project director considers the project sustainable due to the interest from the community. They are clearly respected and valued within the communities. However, we have concerns about the sustainability if the project is unable to continue providing sheep and other alternative livelihood methods.

The project has been effective, educating local communities about the importance of maintaining them. However, it is unclear exactly how well the increased knowledge has led to reduction in human-wildlife conflict and reduced degradation of Volcanoes National Park. Human behavior research shows us that simply knowing a behavior is wrong doesn't necessarily lead to ceasing the behavior. However, CHT focuses on school children, and in time results may become more apparent as they grow into household leaders and decision makers.

Community Questionnaire.

2x Female, school teacher.

Male, school teacher.

The community members were clear that the project helps their schoolchildren with hygiene, living with the environment, and conservation. They believe that the presence of CHT and its benefits improve their lives in many ways including donating sheep, attracting tourists, and community pride in the gorillas and the environment.

Malawi – International Fund for Animal Welfare (IFAW)

Chikolongo Village near Liwonde National park

Contact: Keith Bohannon, IFAW.

Short Description:

The Chikolongo Livelihoods Project is focused on the extended community of Chikolongo which is south of Lake Malawi across the Shire river from Liwonde National Park in Southern Malawi. The Chikolongo community encompasses a rural area with about 90,000 people (mostly maize subsistence farmers) populating four villages led by Chiefs. Liwonde National Park is one of Malawi's most important reserves, endowed with diverse habitats and wildlife.

Problem:

Villagers were often attacked by crocodiles and hippos often on their way to the Shire River to get water. Farmers have also suffered casualties protecting their crops from elephants. 92% of the village had reported significant crop damage due to elephants. Some villagers also went into the park to poach wildlife in order to provide for their families, resulting in thousands of snares littering the landscape and leading to painful injury and death for wildlife.

Solution:

The project's primary objective is to "reduce human animal conflict in Chikolongo village whilst improving food security and nutrition." The project is meeting these goals by eliminating the need for people to go into the park and preventing conflict-causing wildlife from entering the village. The project erected a fence between the park

and the community, proved a water pump for drinking and irrigation, and improved food, nutritional, and job opportunities.

Community Member Involvement:

The project was built on “participatory community engagement” which has led to trust and a “social license to operate (SLO).” Specifically, a baseline survey of community needs was conducted using consultations, focus groups, and key informant interviews. The first intervention, to build water supply for the village, was developed after community input illustrated it was a primary reason for wildlife-related injuries and deaths. The project has maintained that relationship through rigorous outreach and evaluation and has adjusted the project accordingly. For example, the project added 1.5 km of pipeline, transporting water further into the village in response to community input.

Community members are also heavily involved in implementation. An example is managing the rotation of the 25 irrigated community plots. Another example is community members “bought in” to the fish ponds by building them. 25 families in the community worked on the ponds and therefore own a share of the fish.

Human Wellbeing:

Ecological Diversity and Resilience: The project has in essence eliminated entry into the park to conduct unsustainable resource gathering and poaching. Reduced poaching and habitat degradation will allow wildlife populations and important ecosystem services to recover.

Standard of Living: Malawi in general is highly reliant on maize and is vulnerable to extreme climate events including both drought and flooding. The project aimed to alleviate this concern by providing access to water for both drinking and irrigation and diversify food sources (rice, fish, ducks, and chickens). In three years, the percentage of community members reporting that they are not able grow enough food to eat has decreased from 92% to 44% and there has been a significant increase in the consumption of protein; seven fish ponds hold approximately 50,000 tilapia. Additionally, there has been no crop damage from wildlife since the fence was erected. Further, the project provides several sources of employment for community members including 40 bee hives which produced about 10 kg of honey per two months.

Health: Before implementation of the project, crocodile attacks would kill 3–4 people per month as community members would travel to the park for water and game. The border fence and water pump have severely reduced attacks. The water pump has also improved sanitation.

Education: The project provides trainings to community members on improving agricultural productivity, money management, and other practical topics. The project also developed and provided schools supplies and materials on elephant ecology and human-wildlife conflict. Additionally, the construction of the pump has allowed many more girls to be able to attend educational opportunities as they do not have to spend hours each day fetching water. Lack of training in alternative livelihood techniques was identified as an area that needs improvement. More community members need to be training in fish farming, building and repairing wells and pumps, and other trades in order to improve sustainability of the project and allow for more community ownership of the different aspects of the project.

Good Governance: Not addressed by the project. However, with such a large percentage of the Park's employees being local residents, communities most likely feel better represented and feel that they have a larger role in their government.

Community Vitality: The project has created an 88% change in attitude towards the park and wildlife. Further, the project has resulted in the construction of a sports field and meeting point for community engagement.

Psychological Wellbeing: Poverty causes low psychological wellbeing. The improved standard of living from the project interventions likely leads to improved psychological wellbeing.

Cultural Diversity and Resilience: Not addressed and it is unclear whether local customs and traditions were part of or incorporated in to the program.

Time Use: The construction of a water pump has reduced the need for the long trip to and from the river improving the time use efficiency for many village women and children.

Sustainability and Effectiveness:

The project representative believes that the project is currently not fully sustainable but there is clearly community-based support (known as the Social License to Operate). The project is still reliant on continued support and management. However, with training in management, leadership skills, capacity building, and other training, the project may be able to become self-sustaining.

The project has clearly been effective, dramatically reducing community members entering the park in order to collect resources or poach. The project has also clearly improved safety, health, food security, and nutrition.

Community Questionnaire.

2 Male and 1 Female direct beneficiaries, Male community leader, and non-direct beneficiaries.

Community members stated that the project was important for sustainability, wildlife and human protection, and food security—specifically naming water availability, employment, and safety from wild animals. The respondents were happy about living near the park but there was some dissonance in the role of wildlife. One respondent connected wildlife to tourism while another only saw them as a nuisance.

Indonesia – Health in Harmony

Gunung Palung National Park in Borneo

Contact: Kinari Webb, Health in Harmony.

Short Description:

Gunung Palung National Park, which is in the province of West Kalimantan in Borneo, Indonesia, contains diverse habitat types and wildlife including orangutans. There are approximately 65,000 people living around the park, with most of them being farmers.

Problem:

Before the onset of the project, most of the villagers around the park were pushed to illegal logging in the park in order to make money to pay for expensive and distant health care. Illegal logging is a primary driver of the high deforestation rates in Borneo, one of the world's most biodiverse regions.

Solution:

The ASRI project was started in 2007 to find the root cause of the logging and protect the forest and improve the livelihoods of the community members. Using a form of community engagement called “radical listening”; project implementers learned that lack of health care access was the primary driver of illegal logging. ASRI provided health care at reduced cost for those not engaging in logging, provided training in sustainable farming practices, and worked to restore cleared forests.

Community Member Involvement:

The ASRI project was built on community involvement from the onset from planning to implementation through monitoring and evaluation. Implementers engaged in over 400 h of community meetings in a total of 34 meetings to find out community needs. The program continues to hold meetings to understand how villagers feel about specific interventions and if they are working as intended. Further, ASRI’s “radical listening” allows the community ideas to be made into programs including the Forest Guardian Program and Chainsaw Buyback Program which only exist because the community came up with the ideas.

The Forest Guardian Program and the sub-village deforestation status colors are great examples of the community involved in implementation and change.

Human Wellbeing:

Ecological Diversity and Resilience: The project has dramatically reduced deforestation from illegal logging by villagers. In the first five years, the number of loggers dropped from an estimated 1350 households to 450 in 2012. The most recent estimate is 180 households. It is estimated that the trees saved by the program have resulted in 1500 orangutans saved. ASRI’s reforestation project has resulted in new forest where slash and burn agriculture was previously. Reforestation has led to wildlife returning. Camera traps have captured orangutans, sun bears, leopards, and others. The project has also seen the spread of sustainable and organic farming techniques which put less pressure on water and soil resources.

Standard of Living: The ASRI project has improved the standard of living in the communities by reducing the cost of health care, providing high paying jobs, and alternative livelihoods initiatives such as the Goats for Widows Program, Kitchen Gardens, and the Chainsaw Buyback Program. As of the most recent comprehensive survey in 2012, average income has increased substantially.

Health: Central to the project is improving access to health care to villagers by bringing quality and affordable health care to the village. In the first five years of the project, infant deaths decreased by over 3 fold and there has been a dramatic reduction in disease.

Education: The program employs a community education program tailored for all ages so villagers learn about the connection between human health and environmental health. One example is the ASRI Kids course which teaches elementary school students about the environment through experiential learning. Villagers were also able to learn about sustainable farming techniques. More than half of the reformed loggers switched to farming.

Good Governance: Not directly addressed by the project. However, programs like the Forest Guardians program which employs locals to monitor village conditions and deforestation activities, potentially allow villagers to feel that they have a role in governance.

Community Vitality: Not directly addressed by the project, but anecdotal evidence and community surveys suggest that community members understand and take pride in the forest, wildlife species, and ecosystem services.

Psychological Wellbeing: Community members are employed as much as possible to improve the feeling of financial security. Further, villagers know that they have access to health care which reduces stress and anxiety.

Cultural Diversity and Resilience: Not directly addressed by the project, but one of the unique facets of the health care access program was allowing for villagers to pay for healthcare by bartering instead of through currency. This is an innovative strategy for incorporating village customs into interventions.

Time Use: Programs like the Goats for Widows Program and Kitchen Gardens allow for better allocation of time. Further, bringing medical care into the villages eliminates the 2-h trip that was the previous norm.

Sustainability and Effectiveness:

The project contact believes that the project is sustainable. This is due to the secured funding for the clinic, involvement of local community members both as clients and as ASRI employees, and interest from the younger generation. While outside funding is certainly still needed, the project is obviously deeply embedded and appreciated by the community.

The project has clearly been effective, dramatically reducing illegal logging in and around the national park, improving access to health care for the communities, and re-growing cleared forest.

Community Questionnaire.

Female Teacher.

Male Government Contractor.

Female Housewife.

Community members felt strongly positive about the health service and education programs. They also identified water quality, medicine plants, and climate as benefits of a healthy forest and why the ASRI program is important for protecting the forest. Community members varying levels of connection to the wildlife species and the surrounding community but all felt connected to nature.

India – Whale Shark Campaign, Wildlife Trust of India (WTI)

Gujarat State, India

Contact: Rupa Gandhi Chaudhary, WTI.

Short Description:

With an extensive 1600 km of longest coastline among all maritime states of India, the state of Gujarat situated on the West coast of India has been recognized as the home ground of the world's largest fish: the whale shark (*Rhincodon typus*). In Gujarat, the fishing communities called it 'barrel' — an homage to the barrels used to hunt the species. The fish were hunted by the hundreds for liver oil used in water-proofing boats and the by-product meat was exported until the end of twentieth century. The Whale Shark Campaign is working with approximately 5000 fisher folk from five fishing villages on the Saurashtra coast.

Problem:

Fishermen would opportunistically hunt whale sharks for their liver oil, as well as fins and meat. During a survey period between 1999 and 2000, 591 whale sharks were killed with nearly 300 landed in one month alone (December, 1999). Despite being protected under the Indian Wildlife Protection Act in 2001, the whale sharks continued to be hunted due to low awareness of the law.

Solution:

In 2004, IFAW-WTI partnered with the Gujarat Forest Department to start the Whale Shark Campaign to protect to reduce whale shark hunting by increasing awareness and changing behavior in the fishing communities. The campaign has successfully turned the fishermen from hunters into protectors. The project also incentivizes fishermen to cut their nets to rescue entangled whale sharks by compensating for gear losses.

Community Member Involvement:

The project continuously monitors acceptability and adapts the project based on feedback. The community is also heavily involved in whale shark rescue as well. They are heavily involved in the actual rescuing as well as making suggestions and improvements to rescue protocol.

Human Wellbeing:

Ecological Diversity and Resilience: Gujarat recorded 591 whale shark killings during the survey period from 1999 to 2000 with a maximum recorded landings of 279 sharks in Dec 1999 alone and nearly 40 whale sharks landed in a single day. Since the launch of the whale shark campaign in 2004, whale shark hunting by fishermen has essentially ceased. From 2004 to the end of 2017, a total 687 whale sharks have been released by fishermen on Gujarat coast of which 50% rescues have been undertaken by fishermen themselves. The project also conducts research on whale shark biology through monitoring, tagging, and genetic analysis.

Standard of Living: Before the project, seasonal hunting of whale sharks was a way to get supplemental income. However, the project was able to offset some of that income loss by compensating for gear loss when a whale shark is entangled in the netting and fishermen have to cut their own netting to set the animal free. Additionally, the project is exploring the possibilities of establishing whale shark tourism in India to incentivize coastal communities to contribute towards the conservation of marine wildlife and habitats.

Health: Not addressed and it is unclear whether health has changed.

Education: Not addressed and it is unclear whether education has changed.

Good Governance: Not addressed by the project. However, it can be inferred that the community's trust in government has increased due to the Gujarat Forest Department compensated any fisherman that cut their nets in order to free entangled whale sharks. The timely and correct payment of compensation fosters trust. Nearly Rs 70 lakh has been paid to fishermen and over 600 rescues affected since 2005.

Community Vitality: The community people have changed their perception to look at Whale Shark as an important ecological component of marine wildlife and coastal biodiversity. Whale Shark Day is celebrated each year in eight coastal cities where the fish is their mascot. Additionally, according to community member surveys, the fishermen take a large amount of pride from the presence of whale sharks and the importance of their area as their feeding and breeding grounds as well their integral role in their conservation as rescuers and documenters.

Psychological Wellbeing: Taking pride in their role in protecting whale sharks may lead to improved psychological wellbeing.

Cultural Diversity and Resilience: Many of the community members are very religious and respect religious leaders. One of the project's main strategies was to engage with religious leaders so they could teach the community about the importance of the whale sharks to their coastal community and livelihoods.

Time Use: Not addressed and it is unclear whether time use has changed.

Sustainability and Effectiveness:

The project contact believes that the project is sustainable due to the fact that the project is community led, which has resulted in acceptability and a sense of ownership among stakeholder communities. Government buy in is also key, allowing for compensation for gear loss.

The project has clearly been effective, turning hunters into protectors. Since the launch of the whale shark campaign in 2004 to the end of 2017, a total of 687 whale sharks have been released by fishermen on Gujarat coast, of which 50% rescues have been undertaken by fishermen themselves. Further, as a result of the project, whale shark ecology, biology, and life history are better understood.

Community Questionnaire.

2x Male Fisherman.

2x Male Fisherman community head.

Community members agreed that the project has helped them learn to live with wildlife. Fishermen always release whale sharks and document it and the compensation for lost nets is key.

Community members feel pride in the whale shark and their role in its conservation. They are happy to be seen as conservation heroes and understand the ecological importance of the animal to their coastal ecosystem and the fish that rely on it. The whale shark conservation also provides a sense of identity for the community.

All community members identified strong connections within their community and to the whale sharks.

Tanzania (Kilombero) – African Wildlife Foundation (AWF)

Kilombero Landscape, Tanzania

Contact: Jimmiel Mandima, AWF.

Short Description:

Kilombero landscape, located in Southern Tanzania, is the largest seasonal wetland habitat in Africa and therefore home to a large number of iconic wildlife species including endemic species like the Kilombero weaver, and imperiled species like the African elephant. The landscape is home to several native and non-native tribes, there are approximately 100,000 small-scale farmers cultivating predominantly rice and cocoa.

Problem:

Kilombero Valley has experienced rapid population growth and therefore agricultural production has increased. In many cases, agricultural production is increased at the expense of wildlife and wildlife habitat. Further, farming techniques are subpar in many cases resulted in low-income. The rate of habitat loss and degradation is not sustainable.

Solution:

The African Wildlife Foundation (AWF) is working with the International Union for the Conservation of Nature (IUCN) to implement the Sustainability and Inclusion Strategy for Growth Corridors (SUSTAIN) program in the Kilombero landscape starting in 2015. The project is aimed at fulfilling community needs for water, land, and food in a sustainable and nature based fashion. The program set up a consultation program for 2000 small-scale farmers to improve production sustainably.

Community Member Involvement:

Community members have been involved from the project design, the inception, and throughout implementation. Community member needs were captured in the first phase and incorporated into planning and implementation. The project conducts regular check-ins with the community to assess interventions. For implementation, the community is heavily involved in the project's local governance of natural resources including tree planting, water use associations, participatory forest management partnerships and others.

Human Wellbeing:

Ecological Diversity and Resilience: The project has focused on watershed management and biodiversity conservation as the two main ecology related objectives. To that end, the project has established participatory forest management partnerships, ecosystem services payment schemes, and catchment committees to manage and monitor water resources.

Standard of Living: The project has improved income for participating farmers through improved farming techniques and equipment. Participating farmers were able to use new sugar cane and cocoa varieties that improved production and income. The project has also partnered with sugar cane buyers to ensure that there is a good market for the farmers to sell to.

Health: Project contact believes that the watershed protection initiatives have helped improve health, presumably through improved water quality however we were not provided data.

Education: Project contact said education was indirectly addressed, likely through training programs that taught sustainable farming techniques.

Good Governance: The project identified governance as an issue with room for improvement. The project provided several awareness trainings to local communities regarding the need for good governance in land use and natural resource management. Local community management bodies have been established including a catchment committee to govern water resource management.

Community Vitality: Community vitality likely improved due to structural involvement of community members in their own natural resource governance such as through the catchment committees and forest management partnerships. Community surveys indicated pride in local biodiversity.

Psychological Wellbeing: Taking pride in their role in protecting their watershed and local wildlife may lead to improved psychological wellbeing.

Cultural Diversity and Resilience: Not addressed and it is unclear whether this changed.

Time Use: Not addressed and it is unclear whether time use has changed.

Sustainability and Effectiveness:

The project contact believes the project is sustainable because the strong partnerships have been established with local government authorities, the private sector, and communities. The program has been supporting government policies and partners have showed the commitment by embedding the activities in to their work plan and allocating funds accordingly. Additionally, community surveys indicate that the program is popular. However, the program is heavily reliant on funding so there is a question whether the benefits would continue without funding. But, the program is still relatively new and with continued investment may see more sustainability.

The project has been effective at improving the livelihoods of small scale farmers through improved farming techniques and equipment. Further, the project is improving watershed management and spreading sustainable agricultural practices.

Community Questionnaire.

Male Councilor.

2x Male Farmer.

Community members feel that the project is helping the community by promoting and giving training of sustainable agricultural practices and protecting water quality. The councilor also mentioned he now understands the importance of the area as a wildlife corridor. All three community members felt connected to their communities, must there was a less agreement on connection to wildlife. There was some pride in wildlife but also perceived risk of damage to crops. The farmers expressed that the benefits only go to cocoa farmers which may indicate the need for upscaling.

Tanzania (Mbeya) – African Wildlife Foundation (AWF)

Mbeya Landscape, Tanzania

Contact: Jimmiel Mandima, AWF.

Short Description:

The Mbeya landscape is known as the Southern Highlands of Tanzania and is the headwaters for several major rivers and basins. The lush climates support a variety of habitat types which in turn support a wide variety of wildlife species, many of conservation concern. The communities in the landscape consist of mostly farmers growing rice, maize, beans, and cash crops such as cocoa and avocado.

Problem:

The average household size is six people with average annual income of \$300. Literacy level is low with the majority having only primary education. Their agricultural production system is poor causing environment degradation which perpetuates a vicious cycle of poverty. Crop production per acre e.g. maize and potato is 300 kg and 1500 kgs while the full potential production can reach 2400 kgs and 8000 kgs respectively. Transportation infrastructure in rural areas within the landscape is very poor hence limiting access of farm inputs and health services. Agricultural production is quickly expanding in ecologically sensitive areas across the landscape—yet not in a way that is sustainable or particularly beneficial to small farmers.

Solution:

The African Wildlife Foundation (AWF) is working with local stakeholders to benefit both the farmers and the habitat by increasing agricultural yields in a sustainable and environmentally friendly way. AWF intends to accomplish this by incentivizing

farmers to use conservation practices and collaboratively developing land use plans that better maintain water quality and other ecosystem services.

Community Member Involvement:

The program ensured community participation at every stage. AWF conducted stakeholder consultation before planning and the first intervention was a partnership between community members and a avocado company. Other interventions such as the Participatory Forest Management method and Water User Associations approaches involve community members from inception. Further, land use planning was conducted by local communities; in other words, villagers zoned their own village. The sum of the above strategies is that community institutions carry out management and conservation of natural resources for their own benefit. An example of community-led project evolutions is that the project added food crops like maize and rice in addition to avocados because of community input.

Human Wellbeing:

Ecological Diversity and Resilience: One of the key results of the project has been improved conservation of water and land resources. This is accomplished by legally binding land use plans that protect conservation areas, organic pesticides and fertilizers made and used by farmers, soil and water conservation measures used by farmers, and natural resource management plans designed and implemented by the community. Essentially, farmers are growing more crops on less land with fewer inputs and less damage to the environment.

Standard of Living: Crop productivity has increased by 5-fold, production costs are reduced, and farmers are using organic and sustainable techniques. Because of the sustainable and high yield agriculture and a market for farmers to sell to, farmers are seeing much higher standards of living.

Health: Because of the sustainable and high yield agriculture, communities are able to afford health care.

Education: Because of the sustainable and high yield agriculture, communities are able to afford education.

Good Governance: Before the project, there was a lack of coordination between government and community, no defined roles for conservation, education, and health services. The project improved governance of natural resources dramatically through covenants, public-private partnerships, and community-led resource management associations. The deep involvement of community members in their own governing and policy decision making directly leads to trust and participation in governance.

Community Vitality: High community member involvement in the governance structures set up by the project is indicative of improved community vitality.

Psychological Wellbeing: Poverty caused low psychological wellbeing. Because of the sustainable and high yield agriculture, households are able to provide for their families improving psychological wellbeing. Food security contributes greatly to improved wellbeing.

Cultural Diversity and Resilience: Not explicitly stated, but it is apparent that the project used the existing village structures and culture as a way to deliver change in land use and farming techniques. In other words, the project relied on existing cultural norms (in this case a strong village identity).

Time Use: It is unclear whether time use has changed.

Sustainability and Effectiveness:

The project is self-sustaining due to a variety of factors. There is adequate local capacity for sustainable farming techniques to continue sustainable farming. Further, land use plans are being enforced at the local level. In addition, community intuitions are heavily involved in the carrying out of management and conservation of natural resources as opposed to top-down management from distant government. Finally, the agriculture company that AWF provided a loan to for the first intervention is now running on its own without additional outside funds.

AWF has effectively fulfilled its goals of both increasing community livelihoods and better protecting natural resources. Essentially, farmers are growing more crops on less land with fewer inputs and less damage to the environment. Further, communities are involved in land use planning that protects natural resources.

Community Questionnaire.

No community questionnaire but the project contact believes that community members can link wildlife with improved livelihoods through wildlife tourism and presence of the project.

Mexico – Conservation Alliance for Laguna San Ignacio

Laguna San Ignacio, Baja Peninsula, Mexico

Contact: Fernando Ochoa, Conservation Alliance for Laguna San Ignacio.

Short Description:

Laguna San Ignacio on the Baja Peninsula of Mexico is a UNESCO World Heritage Site known for the gray whales that migrate there to give birth and raise their young. The lagoon is also a migratory bird sanctuary and important source of fish, abalone, and lobster for local communities. The fisheries are considered sustainable.

Problem:

In the 90s, there was a proposal to build the world's largest saltworks in the lagoon. After years of pushback from the community and environmental groups, the project was cancelled. However, since the area remained vulnerable to development, more work needed to be done to protect the lagoon, its ecosystem services, and the wildlife dependent on its habitat.

Solution:

In 2004, community members and local organizations formed the Conservation Alliance for Laguna San Ignacio (Alliance). The Alliance is working to 1. Secure additional legal protections for the land around the lagoon, 2. Increase local capacity for sustainable business and 3. Monitor environmental conditions and respond to any threats.

Community Member Involvement:

Community involvement is integral to the inception and operation of the project. In fact, the Alliance built off of the community's historical involvement from stopping the salt works project in the 1990s. One of the Alliance partners (Pronatura Noroeste) is made up of all community members and they provided key voices in developing the project strategy. The Alliance ensured community participation and buy-in by holding multiple meetings with community members to ensure the conservation easement rules would work with everyone.

The community has been heavily involved in implementing the conservation easements, both maintaining conserved areas and implement restoration such as mangrove restoration. Communal farmers have begun working on several projects with support from the Alliance, including solar panels and other infrastructure improvements.

Human Wellbeing:

Ecological Diversity and Resilience: Identified as lacking before the project. Through the project, conservation easements have been put into effect on almost 340,000 acres and about 150 miles of coastline. This includes communal farmland, private property, and concessions from the Mexican government. These easements ensure the protection and restoration ecologically vital mangroves, riparian areas, and beaches. Further, ecological monitoring is conducted to ensure conservation easement agreements are being fulfilled.

Standard of Living: The standard of living improved for the communal farmers and other members of the community due to the economic benefits received through the conservation easements and associated monitoring and restoration activities.

Health: Identified as lacking in community before the project. Upon the creation of the Alliance, health aid has been channeled to the community including optometrists, dentists, and other health providers.

Education: Identified as lacking in the community before the project. Alliance member have brought environmental education programs including capacity building. The project contact says that the easement process has brought community members into contact with other environmental groups which have led to environmental education programs.

Good Governance: Little to no land use governance within the area before the project. As part of the project, a land use map and policies associated with it were created with input from the entire community. Land for community members now has legal status, and the community has a governance tool that it did not have before that is also supported by the community at large. One of the Alliance member groups, which consist of community members, is in charge of monitoring.

Community Vitality: The project contact believes that the communal farmers have deeper sense of ownership and kinship to the land and to the biodiversity after signing conservation easements and understanding how protecting the environment helps them. Further, the easements have given them the opportunity for better interactions between community members.

Psychological Wellbeing: Wellbeing may have been improved due to the peace of mind gained from knowing the land, and their way of life, is protected in perpetuity.

Cultural Diversity and Resilience: Not mentioned explicitly but the project clearly drew on the traditional culture that fought together against the salt works project which could have brought more money and jobs but of course hurt many factors including ecological diversity and resilience. Additionally, the communal nature of the “Ejido”, or farming commune, clearly facilitated the project’s success at valuing and including community-based input. The project drew on and strengthened both the cultural attitude towards protecting nature and the community based aspect of the farming commune.

Time Use: It is unclear whether time use has changed.

Sustainability and Effectiveness:

Conservation easements are very long term (in perpetuity) and provide economic incentive for conservation. Community monetary benefits and stewardship costs are

supported by a long term funding mechanism. Further, project and conservation actions associated are supported by the community. Additionally, the Alliance has the means to legally demand compliance of conservation contracts. However, there have been no breaches of contract and the community has received hundreds of thousands of dollars in benefits.

The Alliance's goals are to protect land, increase local capacity, and conduct environmental monitoring. It appears that the goals are being met through the conservation easement program in addition to the environmental education programs conducted by Alliance member groups.

Community Questionnaire.

No community questionnaire but the project contact believes that community members can link wildlife and nature with improved livelihoods through conservation easement payments and other benefits.

Botswana – Great Plains Conservation

Okavango Delta, Botswana

Contact: Anna Rathmann, Great Plains Conservation.

Short Description:

The Okavango Delta is the largest inland delta in the world and is well known for its seasonal flooding which creates ideal conditions for savannah wildlife species. There are several protected areas in the delta including Selinda and Duba reserves. The Great Plains Conservation has been working in Botswana to improve protected areas including Selinda and Duba.

Problem:

Communities that border the reserves are remote, have low income, and poor access to electricity, water, and other basic services. They also tend to have poor education scores due to these factors. The village of Gudigwa is one community that achieved some of the lowest test averages in the region.

Solution:

In 2011, Great Plains Conservation established the Conservation Education Program with a focus on Gudigwa village. The education program included the creation of a school wildlife club and student conservation camps in order to provide the village children supplemental education in conservation so they understood the importance of conservation and their role in it. At the same time, the education program aimed to boost self-confidence and improve overall test scores.

Community Member Involvement:

The Conservation Education Program works directly with the headmaster and teachers to implement the wildlife club and student conservation camps. Further, the program facilitates feedback from community members and has changed lesson plans and approaches in response. One of the primary staff facilitators is a member of the local community who went through a similar education program and now leads education at the student conservation camps.

Human Wellbeing:

Ecological Diversity and Resilience: The community understands the importance of conservation and therefore human-wildlife conflicts areas reduced and environmental

stewardship is improved. The goals of the program, specifically the strategy of working with primary school-aged children are very long term so the ecological diversity and resilience outcomes may not be apparent for some years to come.

Standard of Living: The program's conservation education allows schoolchildren to gain the knowledge they need for jobs in the tourism, government, or science fields including wildlife monitors, safari guides, land managers, and many others. Tourism the major employer in the region and the program helps community members be able to be employed in that industry.

Health: Not addressed and it is unclear whether health has changed.

Education: Gudigwa village had one of the lowest ranking primary schools in the region. Since the project's inception, test scores have significantly improved. Additionally, anecdotal evidence suggests an increased literacy in wildlife and conservation issues.

Good Governance: Great Plains worked within the existing governance structure in implementing the education program. Gudigwa village is one of 5 villages that are in the Okavango Community Trust which is a community led formal governance structure that allows for revenue sharing of tourism based dollars. Great Plains worked with the Trust to build the education program.

Community Vitality: The project contact believes that the education program has imbued a sense a pride in the community.

Psychological Wellbeing: The project contact mentioned that the programs are intended to boost the schoolchildren's self confidence in addition to teaching them about conservation. The increase in test scores and anecdotal evidence supports this.

Cultural Diversity and Resilience: Great plains worked directly with the school system and all stakeholders from the schoolmaster, to the teachers, to the students in order to work within the existing school structure and culture.

Time Use: Not addressed and it is unclear whether time use has changed.

Sustainability and Effectiveness:

The program is considered sustainable because of its long term commitment to community. The program and Great Plains Conservation has gained the trust of local leaders, teachers, and parents who view the conservation education as positive. The student conservation camps are dependent upon the in kind donation of Great Plains' safari camps, but even without that, it is likely that the community would continue to value conservation and implement conservation education.

The program has been highly effective at improving test scores in Gudigwa primary school and teaching the schoolchildren the importance of conservation, which was the primary goal of the program.

Community Questionnaire.

Male Community Member.

Male Teacher.

Female Student.

All respondents expressed pride and happiness with the wildlife and nature in and around their community. The teacher talked about the importance of conservation learning such as the importance of trees and not cutting them down to the community. There was also an understanding that the presence of wildlife helps sustain the economy through tourism.

Mozambique – Gorongosa Project

Gorongosa National Park, Mozambique

Contact: Denise A. Robertson, Gorongosa Project.

Short Description:

Once one of Africa's pristine national parks, Gorongosa National Park and its abundant wildlife were decimated by the post-colonial civil war and extended poverty. After the war, the Mozambique government attempted to restore the park but was hampered by lack of infrastructure and charismatic wildlife to attract tourists. There are an estimated 175,000 to 200,000 people in Gorongosa Park's buffer zone.

Problem:

Gorongosa's buffer zone communities suffer from poverty, a lack of basic services in community, poor healthcare, and education. Illegal snaring, human wildlife conflicts, and illegal forestry are all threats the park is dealing with.

Solution:

In 2008, The Mozambique government and the Gregory C. Carr Foundation signed a 20 year agreement to establish a sustainable tourism industry that included community livelihood interventions as a key feature. Besides restoration and translocation to improve habitat and wildlife, the goal was to foster a sense of collective ownership of the park among the communities residing in Gorongosa's buffer zone and boost local protection and reduce human wildlife conflict, poaching, and illegal logging by improving their living standards. The Gorongosa Project works with national and local governments to provide basic services including health care, education, wells, alternative livelihood development, and many other development interventions.

Community Member Involvement:

One of the stated goals of the Gorongosa Project is to work within the communities surrounding the park. As part of the initial project, a community relations department was founded to establish contracts with community representatives to oversee the sharing of 20% of the park's revenues, recruit local employees, and guarantee local access. Today, 85% of the park's 500 permanent employees, including the warden, and all temporary employees are recruited locally, ensuring community involvement in the project. The project also is conducting a comprehensive survey of households in the buffer zone to inform management policy.

Human Wellbeing:

Ecological Diversity and Resilience: Wildlife recovery has accelerated as a result of the project, with nearly 80% of the estimated pre-war biomass as of 2016. Nearly all extant large-mammal populations are increasing. Recovery is attributed to habitat protection, reduced poaching, and translocations. However, species richness is an area still needing improvement with key species still missing or at low populations including apex predators like leopards and hyenas.

In 2010, the park was able to expand to include Mount Gorongosa itself and its vitally important headwaters and biodiverse forests.

Standard of Living: The communities around Gorongosa are very poor and there is low capacity to provide even basic services. However, the Gorongosa Project, through many different means, has improved living standards. The project ensures 20% of park revenue goes to communities and 85% of the park's 500 permanent employees and all temporary

employees are recruited locally. Further, the project provided agricultural and agroforestry assistance to nearly 3000 farmers by providing training and equipment. The project also pays market prices to buy surplus crops and sells them back when needed. The project is also supporting alternative livelihood development (honey and coffee) and plans to build processing capacity locally.

Health: Communities in the buffer zone suffer from high infant mortality, malnutrition, and high instances of malaria. The Gorongosa Project has improved community health by working with the Mozambican government to employ interventions including Mobile Health Brigades in 16 communities. In 2016, they vaccinated nearly 5000 children and supplied more than 2400 bed nets, treated 1700 malaria cases and provided 1700 prenatal consultations. Community health workers are also employed for permanent health presence.

Education: The Gorongosa Project works with the Mozambican government to provide education opportunities to the communities in the buffer zone. The project arranges for students from neighboring villages to have educational field trips to the park (2500 local children on full day educational trips each year). They have also build four 4 schools and have provided several scholarships for university degrees. The project has identified “development of young Mozambican talent” as a key to the future success of the project, park, and communities. The project is also providing agricultural and agroforestry training. Finally, the project has started girls club in 17 schools designed to help them stay in school and they plan to upscale to all 90+ schools in the buffer zone.

Good Governance: Not addressed by the project. However, with such a large percentage of the Park’s employees being local residents, communities most likely feel better represented and feel that they have a larger role in their government.

Community Vitality: One of the main goals of the project is to instill a sense of collective ownership of the park within the communities of the buffer zone. Many of the interventions such as bringing schoolchildren into the park and ensuring communities receive a portion of the park’s income help with this goal. One specific goal is to ensure residents of the buffer zone are the largest group of Park visitors.

Psychological Wellbeing: Poverty causes low psychological wellbeing. The improved standard of living from the project interventions likely leads to improved psychological wellbeing.

Cultural Diversity and Resilience: Not addressed and it is unclear whether local customs and traditions were part of or incorporated in to the program.

Time Use: Not addressed and it is unclear whether time use has changed.

Sustainability and Effectiveness:

The Gorongosa Project is highly sustainable. The initial 20 year agreement with the Mozambican government and funders was extended by 15 years in 2016 ensuring government support and funding. The \$9 million annual budget is currently supplied by donors, but the project is taking steps shift to a self-sustaining nature-based tourism model. Even then, the project has effectively brought in donors and international development dollars and will continue to for the foreseeable future. The project’s focus on community development and relationships with the communities surrounding the park ensure local buy-in.

The project has been effective at improving human development indicators from education to income to health. Restoration of the park’s decimated wildlife continues but more time is needed.

Community Questionnaire.

No community questionnaire was submitted.

Appendix II

Updated Questionnaire 12/19/2017.

Section I: General Understanding of Project and Community.

Please fill in any additional information that you would like.

Describe the landscape and wildlife of special concern.

Describe the community or communities that the project works with.

Describe the project and its mission. Why was the project started? Who started it?

How long has it been going on?

Section II: Community, benefits, and success.

These questions and your answers will form the heart of our research. Please answer the questions below thoughtfully and with detail.

Project Success and Sustainability.

Q: Why do you think the project has been successful?

A:

Q: Do you think the project is sustainable? Why exactly do you think that?

A:

Q: Do you think the community members feel differently about the wildlife or their lives because of this project?

A:

Community Involvement.

Q: How deeply would you say the local community was involved in project planning? Please describe in what ways.

A:

Q: Is the local community similarly involved in implementation? Again, please be detailed!

A:

Q: Has the local community been involved with helping the project change and evolve? Please describe in detail.

A:

Economic/Non-economic Factors.

Here are some examples of non-economic factors: Psychological Wellbeing, Good Governance, Health, Education, Community Vitality, Cultural and Tradition, Ecological Diversity and Resilience.

Q: Do any of these factors stand out as areas that were especially lacking in the community before the project? Feel free to explain.

A:

Q: Were any of these factors included in project planning? Feel free to explain in further detail.

A:

Q: Was there any change in any of these factors after the project was implemented? Please be detailed.

A:

Q: Can you describe the purely economic benefits of the project to the local community?

A:

Section III: Community Member Questionnaire.

If you are able to, please ask the following questions to a set of at least 3 diverse members of the community who interact with or benefit from the program or the wildlife.

Name:

Gender:

Occupation:

Q: What do you think about this project? Does it help your people live with wildlife?

A:

Q: Do you feel pride about your local wildlife?

A:

Q: Do you feel connected to your community? To the surrounding nature? To the animals?

A:

Q: Do you think this project benefits yourself and your community? How?

A:

Name:

Gender:

Occupation:

Q: What do you think about this project? Does it help your people live with wildlife?

A:

Q: Do you feel pride about your local wildlife?

A:

Q: Do you feel connected to your community? To the surrounding nature? To the animals?

A:

Q: Do you think this project benefits yourself and your community? How?

A:

Name:

Gender:

Occupation:

Q: What do you think about this project? Does it help your people live with wildlife?

A:

Q: Do you feel pride about your local wildlife?

A:

Q: Do you feel connected to your community? To the surrounding nature? To the animals?

A:

Q: Do you think this project benefits yourself and your community? How?

A:

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