



Livelihood investments as incentives for community forestry in Africa

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ABSTRACT

This study examines community incentives to participate in donor-sponsored community forestry initiatives using the case of a multi-year biodiversity conservation and sustainable livelihood project in West Africa sponsored by the U.S. Agency for International Development. In this project, communities established community forests and prohibited most extractive uses to promote forest biodiversity conservation, receiving livelihood and water infrastructure investments in return. I assess whether livelihood investments are an effective incentive-based conservation strategy for community forestry initiatives, and in what context; and, once external project support ends, whether community forestry based on this incentive strategy persists. I examined community forestry in 27 communities across three study areas in Guinea and Sierra Leone between 2012 and 2015, when the project ended, and conducted a follow-up assessment in 2018 to see whether community forestry persisted post-project. I found that, despite mixed benefits from livelihood activities, livelihood investments were effective incentives for community forestry during the project's lifetime. Most successful were Village Savings and Loan Associations and tree nurseries and plantations (coffee, cacao, oil palm, rubber), both of which provided tangible economic benefits to participating households. Intrinsic incentives associated with the ecosystem services community forests provide were also important. All but one community forest persisted 2.5 years post-project, though management byelaws had informally changed in many community forests to allow more extractive uses. These changes were least evident in the study area where benefits from livelihood investments were greatest and endured. This study demonstrates that livelihood investments can be effective in-kind incentives for community forestry in Africa, whether as central or ancillary incentives, but more effort is needed to design livelihood investments that deliver their expected benefits. Context also matters; there is a need to better understand the relationship between incentive types, community forestry model, and the social-ecological conditions in which community forestry occurs.

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1. Introduction

Recent decades have seen the emergence of community forestry initiatives worldwide that aim to promote biodiversity conservation, forest restoration, and carbon sequestration while contributing to poverty alleviation and rural community development. Consistent with this trend, since the 1990s, many African countries have adopted policies and programs that support community forestry (Barrow et al., 2016; Duguma et al., 2018; Wily, 2002). Although formal, state-led protected areas appear to predominate as a forest conservation strategy in Africa, forest management institutions involving co-management of government forest reserves by the state and local communities, and devolution of management rights and responsibilities to communities for community forests on village lands have become increasingly common (Kimengsi, 2022). These efforts are often initiated and funded by

international donor organizations (i.e., bilateral/multilateral aid agencies), national or international conservation organizations, or the state (funded by external organizations) (Minang, Duguma, Bernard, Foundjem-Tita, & Tchoundjeu, 2019; Piabuo, Foundjem-Tita, & Minang, 2018), and are therefore top-down initiatives.

State governments have incentives to participate in such initiatives – e.g., to gain access to international donor funding (Fairhead & Leach, 2003; Movuh & Schusser, 2012; Schusser, 2013; Treue et al., 2014); to mitigate the inability of state forestry institutions to manage forests effectively owing to lack of resources and capacity (Charnley & Poe, 2007; Schroeder, 2005); and to improve forest conservation, sustainable forest management, and the livelihoods of forest peoples (Blomley & Ramadhani, 2006), with reputational advantages. But why do communities participate, and how do these external initiatives align with their interests? This question is especially pertinent where the community forestry model introduced is protection- rather than production-oriented, generates lit-

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tle revenue, reduces access to forest resources, or calls for changes in existing forest management practices.

Here I examine incentives for communities to create and maintain community forests established under the auspices of external projects and formally recognized by state governments. Community forestry incentives can be defined as the material benefits communities obtain, or think they will obtain, to offset costs incurred by engaging in community forestry projects (after Agrawal et al., 2018). I focus on one common conservation incentive: livelihood investments, a type of “in-kind” rather than monetary incentive designed to motivate people to support external conservation initiatives (Ferraro & Kiss, 2002). In particular, I look at the effectiveness of livelihood investments in incentivizing collective action for forest biodiversity conservation via community forestry in low-income African countries.

I assess whether (a) livelihood investments are an effective incentive-based conservation strategy for community forestry initiatives, and in what context; and (b) once external project support ends, whether community forestry based on this incentive strategy persists. My geographic focus is Sierra Leone and Guinea, while situating the study within the incentive-based conservation and community forestry literature from Africa. I use the case of the Sustainable and Thriving Environments for West African Regional Development (STEWARDS) Project for this assessment. STEWARDS was a USD \$21 million project whose purpose was to promote regional strategies for and approaches to biodiversity conservation, sustainable natural resource management, and improved livelihoods in the Upper Guinean Forest zone of West Africa (Biodiversity Analysis and Technical Support Team, 2008). A key project component was to establish community forests where improved forest management to promote biodiversity conservation took place alongside livelihood and water infrastructure investments designed to alleviate pressure on natural resources and provide alternate income streams. Although water infrastructure was another potential incentive, it is not the focus here because it was developed after the official project end date.

The STEWARDS project was funded by the United States Agency for International Development (USAID) and implemented in three phases between 2008 and 2016 (Otis, 2013). I participated in the project from 2012–2015 in a socioeconomic monitoring and evaluation role, and conducted a follow-up assessment in 2018 to investigate the status of community forestry, and livelihood and water infrastructure investments, post-project. Livelihood and infrastructure investments have often been used in incentive-based conservation projects. However, their role as incentives for community forestry in Africa, the contexts in which they are most effective, and whether they persist as conservation incentives once projects end, are poorly documented.

2. Background

2.1. Incentive-based conservation

Incentive-based conservation initiatives provide an alternative to the “fortress conservation” model that has predominated in Africa since colonial times. Fortress conservation is based on the notion that people and nature should be separate, resulting in government-imposed protected areas that forcibly displace local residents, prohibit natural resource use within their boundaries, and have high social and economic costs for those affected by displacement (Brockington, 2002; Brockington et al., 2008; Neumann, 2002). Incentive-based conservation arose to help offset the costs of externally imposed biodiversity conservation initiatives and garner support for them by offering benefits to affected individuals and communities (Spiteri & Nepalz, 2006). These extrinsic incentives include financial subsidies, tax exemptions, forest certifica-

tion, and direct (monetary) or indirect (non-monetary/in-kind) payments (Rode, Gómez-Baggethun, & Krause, 2015; Rosa da Conceição, Börner, & Wunder, 2015). Direct and in-kind payments aim to reward people in target locations for protecting biodiversity, recognizing its opportunity costs (Milne & Niessen, 2009). Prominent examples of incentive-based conservation approaches are integrated conservation and development projects (ICDPs) and payments for ecosystem services (PES).

ICDPs emerged in the 1980s in response to shortcomings of the fortress conservation model (Spiteri & Nepalz, 2006; Hughes & Flinton, 2001). Their main goal is biodiversity conservation, but they contain community development components designed to incentivize support for conservation while addressing socioeconomic needs of communities near protected areas. Examples include revenue sharing from tourism to protected areas, developing local enterprises that market products to tourists, building schools and health clinics, and introducing livelihood activities to reduce dependence on natural areas, e.g., tree plantations (Alpert, 1996; Spiteri & Nepalz, 2006; Hughes & Flinton, 2001). In Africa, ICDPs have often been associated with the conservation of large mammals (Alpert, 1996). As with fortress conservation, ICDPs are typically imposed by external actors with conservation agendas and international financing, and generally restrict local residents' ability to use and manage natural resources inside protected areas. These projects have often been deemed failures, though evidence regarding their impacts is limited owing to inadequate monitoring, evaluation, and assessment (Bauch, Sills, & Pattanayak, 2014; Miteva, Pattanayak, & Ferraro, 2012; Newmark & Hough, 2000). The reasons for failure are many and include ineffective incentives that overlook the social factors motivating human behavior, and incentives that fail to promote collective action for conservation because they provide public goods, or have different effects on different groups (Newmark & Hough, 2000).

Limited evidence for successful ICDPs contributed to the emergence of PES as an alternate form of incentive-based conservation (Montoya-Zumaeta et al., 2021). PES are voluntary transactions between a service user (buyer) and service provider (seller) that are conditional on agreed upon rules of natural resource management to generate offsite services above a baseline condition (Wunder, 2015). They differ from ICDPs in that payments (direct or in-kind) are conditional upon providing a service (e.g., biodiversity conservation, carbon sequestration) (Kerr et al., 2014). PES schemes in Africa have been relatively slow to emerge (Ezzine-de-Blas et al., 2016), and most consist of carbon or biodiversity conservation projects that are internationally financed (Wunder et al., 2018). Although originally designed as a mechanism to pay individuals or households for adopting conservation behavior in situations of private property or individual tenure (Wunder et al., 2020), projects in which payments are made to communities with communal tenure systems are becoming more common (Hayes, Murtinho, & Wolff, 2017; Kaczan, Pfaff, Rodriguez, & Shapiro-Garza, 2017; Kaczan, Swallow, & Adamowicz, 2019). Examples from Africa include schemes that pay communities to limit residence and resource use in areas set aside for biodiversity conservation (e.g., Nelson et al., 2010); improve natural resource management or restore degraded lands (e.g., Awono, Somorin, Eba'a Atyi, & Levang, 2014; Waruingi, Mbeche, & Ateka, 2021); and participate in REDD+ projects designed to increase carbon sequestration and storage in forests, sometimes in conjunction with community forestry initiatives (e.g., Blomley et al., 2017). PES projects are rarely ideal types, however; they may have features of both PES projects and ICDPs, or occur along a continuum, according to the degree of conditionality and voluntariness (Duchelle et al., 2018; van Noordwijk et al., 2012; Wunder et al., 2008). Their success has also been mixed (Duchelle et al., 2018; Ezzine-de-Blas et al., 2016; Wunder et al., 2020). Challenges asso-

ciated with PES to communities (rather than individuals) in low-income countries include whether group payments will incentivize changes in individual behavior; whether external payments will undermine intrinsic incentives for conservation; and difficulty of enforcing conditionality (Hayes et al., 2017; van Noordwijk et al., 2012; Wunder et al., 2020).

Incentive-based conservation does not imply that local people need extrinsic incentives to conserve. Customary conservation practices that benefit biodiversity include sacred forest groves in West Africa (Alohou, Gbemavo, Mensah, & Ouinsavi, 2017; Decher, 1997; Lebbie & Guries, 1995), church forests in Ethiopia (Kifle, Noulekoun, Son, & Khamzina, 2022; Klepeis, 2016), and forests protected by taboos in Madagascar (Schachenmann, 2006; Tengö et al., 2007). Local landscape management practices may also have positive effects on biodiversity. In eastern Sierra Leone, historic settlement, farming, and ritual practices resulted in a forest mosaic conducive to bird species biodiversity (Kandeh & Richards, 1996). In Guinea's forest-savanna transition zone, villagers' farming and tree planting practices created forest islands around villages, leading to afforestation over time with biodiversity benefits (Fairhead & Leach, 1996; Leach & Fairhead, 2000).

People also have intrinsic incentives for conservation. These include ecosystem service benefits that support their cultural and livelihood practices; desire to comply with social norms and maintain a favorable social image; a sense of moral responsibility towards nature; or because conservation creates conditions that are more enjoyable or interesting (Bottazzi, Wiik, Crespo, & Jones, 2018; Ezzine-de-Blas, Corbera, & Lapeyre, 2019; Rode et al., 2015; van Noordwijk et al., 2012). Incentive-based conservation initiatives may build on customary conservation practices and intrinsic incentives for conservation, or occur together with them.

Community forestry has seldom been considered within the framework of incentive-based conservation, except when integrated with REDD+ projects (e.g., Newton et al., 2015; Blomley et al., 2017). It can be viewed through this lens when (1) it is formally established through an external initiative; (2) the initiative is driven by forest conservation goals; (3) it alters current or customary forest access, use, and management in ways that facilitate conservation; and (4) extrinsic incentives to participate are part of the initiative. Community forestry under the STEWARD project met these criteria.

2.2. Community forestry incentives in Africa

In Africa, as elsewhere, community forestry initiatives aim to formally confer some degree of responsibility and authority for forest management in local communities; promote sustainable forest use and management, contributing to forest conservation; and provide communities with social and economic benefits (Charnley & Poe, 2007), which help to incentivize forest conservation. Literature assessing whether the social and economic benefits of community forestry materialize in African community forestry is more prevalent than that which investigates incentives motivating participation. Regarding the former, research indicates that the impacts of community forestry on poverty alleviation, household income, and livelihoods can be positive, neutral, or negative, depending on local context and for whom, and that elite capture of benefits is widespread (Duguma et al., 2018; Kenfack Essougong et al., 2019; Ribot et al., 2010). Incomplete devolution of responsibility and authority for forest management from governments to communities in many African countries limits the ability of communities to obtain its benefits (Chomba et al., 2015; Duguma et al., 2018; Ribot et al., 2010).

The more limited literature about community forestry incentives in Africa indicates that incentives vary by country and context and include both intrinsic and extrinsic incentives (Table 1). Joint

management of government forest reserves by the state and local communities entails community residents taking on activities like fire prevention and fire-fighting, patrolling to look for and report illegal activities, and growing tree seedlings in nurseries and planting them on state-owned forest or degraded lands. Often residents do this without direct payment. Commonly cited incentives are a desire to secure economic benefits from forest products, increase access to land and resources on state lands, strengthen customary rights to and decision-making about state-owned forests, and prevent the state from allocating forestland to outside investors and settlers.

In Cameroon, communities apply for concessions of up to 5000 ha on state land to which they have customary rights, where they establish community forest enterprises for commercial timber production for a period of 25 years (Lescuyer et al., 2016). In Mozambique, there are several options for community engagement in managing state forests, including obtaining concessions or logging permits for timber production (Siteo & Guedes, 2015). Key incentives for participation in both places include the ability to obtain revenue from timber and nontimber forest product harvesting, increase local control over forests, and exercise customary rights to forest resources, including excluding outsiders (Table 1). Local development projects as an incentive typically result from community investment of timber or non-timber forest product revenues from community forests.

In African countries where community forestry occurs on lands held communally or by villages, the state devolves responsibility and authority for management of formally designated community forests to communities, which retain some or all of the benefits generated, depending on country policy. Financial incentives to participate are an important incentive, as is the ability to further secure community rights to and control over forests vis-à-vis the state (Table 1). In one Tanzanian case, community development projects chosen by village governments and funded by revenues from timber production in community forests are an important incentive strategy (Frey et al., 2021). In a case from Benin, family lineages with customary forest tenure were paid to manage community forests for conservation objectives, actively enforce management rules, and conduct monitoring (Gbedomon et al., 2016). I did not find other examples in the literature in which community forestry occurred on village lands over which family lineages holding tenure played a central role in facilitating it, rather than the state. The STEWARD case from Sierra Leone and Guinea, described here, provides another.

This review suggests that land tenure influences the nature of incentives for participating in community forestry, and that communities' desires to secure customary rights in resources, increase management decision-making authority, and generate revenue from timber and non-timber forest products are important incentives, especially where community forestry occurs on state lands. Community development projects may often be ancillary incentives. Perhaps for this reason, evaluating their effectiveness as incentives for community forestry in Africa has not been a focus of other studies.

3. The STEWARD project

The STEWARD project took place in two international priority zones (PZs) for biodiversity conservation (Fig. 1). One (PZ1) was a priority for USAID missions in Sierra Leone and Guinea and built on their earlier work there (Biodiversity Analysis and Technical Support Team, 2008). The second (PZ2) was identified during a 1999 conservation priority-setting workshop focused on the Upper Guinean Forest region organized by Conservation International. Although protected areas comprise about 12.5% of the land within

Table 1
Community forestry models and associated incentives in Africa.

Model	Incentives	Examples
Joint management of state forest reserves by the state and local communities	• Ensure continued resource access and use rights on state land • State recognition of customary rights to forest resources • Ability to exclude non-community members lacking customary rights from state forests • Ability to prevent the government from allocating land to private investors or non-local settlers • Economic benefits from harvested forest products or carbon • Compensation for conducting forest management work • Greater role in decision-making about management of state forest lands • Opportunity to farm degraded forest lands inside or adjacent to state forest reserves in the early stages of restoration/reforestation	Ethiopia (Ameha et al., 2014; Ayanaa et al., 2017; Bakala et al., 2022; Gelo & Koch, 2014) Ghana (Acheampong et al., 2018; Osumanu & Samuel, 2017) Kenya (Musyoki, Mugwe, Mutundu, & Muchiri, 2016; Mutune, Hansen, Wahome, & Mungai, 2017; Okumu & Muchapondwa, 2020; Waruingi, Mbeche, & Ateka, 2021) Malawi (Chinangwa et al., 2017; Mazunda & Shively, 2015; Zande & Mzuya, 2022) Tanzania (Persha & Meshack, 2016)
Community management of state forest lands	• Community development and livelihood projects • Revenue from timber and NTFP production • Wages paid to forest workers • State recognition of customary rights to resources on state land • Community capture of resources from external actors (e.g., state, donors) • Increased community control of, and management decision-making over, customary forestlands • Ability to exclude outsiders from illegal, unsustainable forest uses • Training opportunities • Community development projects	Cameroon (Lescuyer, Cerutti, & Tsanga, 2016; Minang et al., 2019; Oyono, Samba, & Biyong, 2012; Piabuo, Foundjem-Tita, & Minang, 2018) Mozambique (Sitoe & Guedes, 2015)
Community or family management of community forests on village/communal lands	• Income earning opportunities through sale of harvested products • Opportunities to establish community forest enterprises • Greater control over forests and ability to exclude outsiders • Maintain forest access, use, and management rights • Pride in community forest • Community development projects • Direct payments to landholding families	Namibia (Schusser, 2013) Tanzania (Frey et al., 2021; Gross-Camp, 2017) Benin (Gbedomon et al., 2016) The Gambia (Tomaselli et al., 2012)

the two PZs, several have poorly defined boundaries, unclear rules of access and use (though they largely exclude people), and weak enforcement of regulations (Biodiversity Analysis and Technical Support Team, 2008; Saxen, Hagen, & Winterbottom, 2008). STEWARD sought to integrate biodiversity conservation, sustainable natural resource management, and improved livelihoods around these protected areas to increase social-ecological system resilience in the Upper Guinean forest region (Biodiversity Analysis and Technical Support Team, 2008; United States Agency for International Development & United States Forest Service, 2012).

The Upper Guinean forest region is a major biome of West Africa spanning some 420,000 km² of Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, and Togo (Biodiversity Analysis and Technical Support Team, 2008; Otis, 2013). It is one of two sub-regions of the Guinean Forest belt, which stretches from Guinea to Cameroon (Biodiversity Analysis and Technical Support Team, 2008). These West African forests are one of 25 global "biodiversity hotspots", so designated owing to high concentrations of endemic species combined with major habitat loss, making them a priority for conservation (Myers et al., 2000). About 20 percent of all mammal and plant species are endemic to the Guinean Forest belt, in addition to 10 percent of bird, 25 percent of reptile, and 38 percent of amphibian species (Biodiversity Analysis and Technical Support Team, 2008). The Guinean Forest belt is also deemed one of the most critical places in the world for primate conservation: 92 percent of all primate species found there are endemic, 21 are endangered, and 5 are critically endangered (Biodiversity Analysis and Technical Support Team, 2008).

High species endemism combined with extensive habitat loss make the Upper Guinean forest region a high priority for biodiversity conservation. According to a pre-project threats and opportunities assessment, roughly 80 percent of the original closed forest cover has been lost over the last few centuries (Biodiversity Analysis and Technical Support Team, 2008). Continuing proximate threats to biodiversity include forest conversion to agriculture, mining, logging, bushmeat hunting, and uncontrolled bushfire, with remaining forest fragments described as "islands in a sea of subsistence and commercial agriculture" (Bode, 2007 quoted in Otis, 2013:6; Biodiversity Analysis and Technical Support Team, 2008). It should be noted, however, that discourses and initiatives pertaining to forest biodiversity conservation in West Africa have been criticized for adopting misleading estimates and assumptions about the nature and extent of deforestation and its causes (Fairhead & Leach 1996, 1998; Leach & Fairhead, 2000; Munro & van der Horst, 2016). These researchers argue that the historic extent of mature forest cover in many West African countries was over-estimated by Europeans during the colonial era, and consequently, estimates of deforestation occurring over the past century or more are exaggerated. They also question whether human population growth and shifting cultivation have been the main historical drivers of deforestation.

STEWARD had several components; it was implemented at the community level by two local NGOs, CARE Sierra Leone in PZ1 and AUDER Guinée in PZ2. Project strategies for achieving biodiversity conservation at the community scale were establishing community forests for sustainable forest management; promoting forest co-

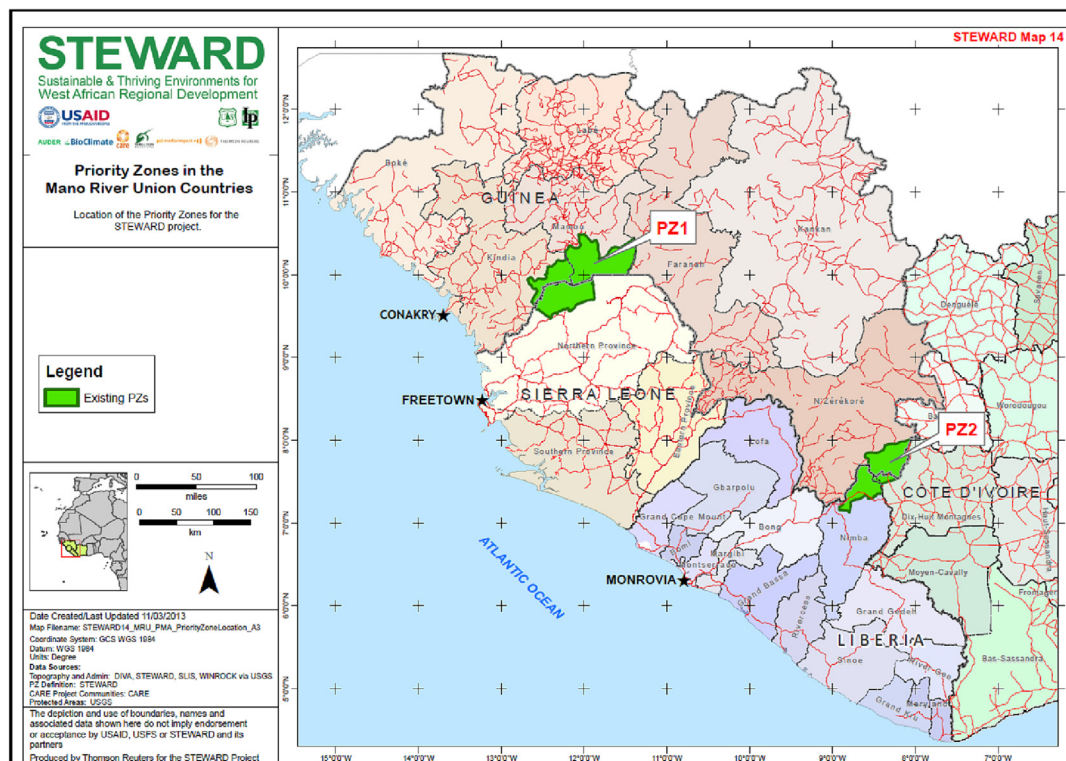


Fig. 1. STEWARD Program Priority Zones. Credit: Thomson Reuters.

management of government forest reserves by adjacent communities; building community capacity for bushfire prevention and control; and livelihood and infrastructure investments to improve livelihoods and incentivize conservation behavior among community members. Community forestry and forest co-management are authorized by the Forestry Act of 1988 and Forestry Policy of 2010 in Sierra Leone (Government of Sierra Leone, 1988, 2010), and Guinea's 1999 and 2017 Forestry Codes (Republique de Guinée, 1999, 2017). The project established community forests in nine communities in PZ1-Guinea, nine in PZ1-Sierra Leone, and nine in PZ2 (Guinea). Co-management of government forest reserves, pursued in other communities, is not addressed here. Livelihood activities were introduced in all communities and water, sanitation, and hygiene activities occurred in most.

3.1. Study areas

PZ1 included 19 communities in Tambaka Chiefdom, Sierra Leone and 19 communities in Kindia and Mamou Prefectures, Guinea. These communities were targeted for project participation because of close proximity to a protected area: Outamba-Kilimi National Park, the Kuru Hills or Kandesuri Forest Reserves in Sierra Leone; Soyah or Pensilli Classified Forests in Guinea. The Susu, farmers, are the dominant ethnic group in PZ1 in both countries, though agropastoral Fula and Malinke peoples have settled there more recently, especially in Guinea.

PZ2 spanned the area surrounding Mount Nimba in Liberia, Guinea, and Côte d'Ivoire. Mount Nimba has protected area status and is designated a UNESCO World Heritage Site in Guinea and Côte d'Ivoire, and a UNESCO Biosphere Reserve in Guinea. In Liberia it is partially protected. PZ2 also contains the Boussou and Dere Classified Forests in Guinea. Project activities were implemented in 20 communities around these protected areas in Lola Prefecture, Guinea and Danané Prefecture, Côte d'Ivoire. Liberia was not included, and STEWARD ceased in Côte d'Ivoire following a border closure

with Guinea triggered by the ebola virus disease outbreak in 2015; neither are discussed here. In Guinea, the dominant ethnic groups are Mano and Kono, who are farmers.

Poverty in both PZs is high. In 2019, Guinea scored 178 and Sierra Leone scored 182 out of 189 countries on the Human Development Index (189 being the lowest score) (United Nations Development Programme, 2020). The primary livelihood activity in the PZs is subsistence farming, which is rainfed and takes place through shifting cultivation (Polasky and Charnley, 2016). The staple crop is rice, but most households can't meet subsistence needs through rice farming and purchase imported rice. Income sources include selling secondary crops (groundnuts, cassava, millet, maize), cash crops (cashews, coffee, cocoa, rubber, oil palm), wild-harvested products (plants, fish, game, honey), or engaging in petty trade or wage labor. Literacy is low, especially among women, with children rarely continuing beyond primary school. Villages lack electricity and rely on fuelwood for cooking. Many households obtain water exclusively from streams, although each community has at least one bore hole for pumping water (Polasky and Charnley, 2016).

4. Methods

I examined whether livelihood investments were effective incentives for community forestry through monitoring and evaluation (M&E) of community forestry and livelihood investments in the 27 communities with community forests across three study areas [PZ1-Sierra Leone (n=9), PZ1-Guinea (n=9), PZ2 (n=9)] during the project's implementation phase (2012–2015). Water, sanitation, and hygiene investments were delayed until 2016 so were not included in M&E. I made seven 2–3.5 week field trips to the three study areas between June 2012 and June 2014. The ebola virus disease outbreak prevented travel between July 2014 and July 2015; I relied on CARE and AUDER staff to gather monitoring data during this period. I conducted a final evaluation during two three-

week field trips in October 2015 (PZ1) and December 2015 (PZ2). I investigated whether community forestry and livelihood activity benefits persisted in the study areas post-STEWARD during a three-week follow up visit in April and May 2018. A second trip planned for 2020 was cancelled because of the COVID-19 pandemic.

I employed a two-tiered approach to M&E, tracking some indicators in all 27 communities and others in six case-study communities (two per study area). These communities were purposively chosen using the criteria: diverse community forest types and sizes; diverse livelihood activities implemented; project activities initiated by 2012; accessible in dry and rainy seasons; located within 5 km of a government protected area; and willingness to participate. I also visited community forests during each field trip to observe activities there and conduct informal conversations with community members most involved in community forestry.

4.1. M&E of improved natural resource management through community forestry

USAID identified two “standard indicators” associated with forest biodiversity conservation for M&E: 1) “number of hectares in areas of biological significance and/or natural resources showing improved biophysical conditions as a result of U.S. Government assistance”; and 2) “number of hectares of biological significance and/or natural resources under improved natural resource management as a result of U.S. Government assistance” ([United States Agency for International Development & United States Forest Service, 2012](#)). Standard indicators are performance indicators USAID uses to report on country development accomplishments achieved through foreign assistance funding. STEWARD provided no funding for M&E to address indicator 1. I focused M&E on indicator 2, assessing whether improved forest management through community forestry occurred, a potential proxy for improved biophysical conditions and biodiversity conservation.

4.1.1. Monitoring

I monitored ten different indicators associated with improved forest management through community forestry ([Table 2](#), columns

1 and 2) using the methods listed in column 3. Structured interviews took place during field visits with staff from CARE and AUDER who led different components of the project. Some interviews addressed activities taking place in all 27 communities, e.g., the process of community forest establishment, change over time (indicators 1 and 2), resource access and use as defined by community forest byelaws (indicator 3), and how governance institutions were structured and performed (indicators 4–5). Others focused on community forest-related topics in the six case-study communities for purposes of triangulating focus group data ([Patton, 2015](#)).

More in-depth monitoring occurred in the case-study communities during field visits, primarily using focus groups ([Patton, 2015](#)). Focus groups included available forest management committee (FMC) members, forest monitors, fire brigades, and NGO staff, with occasional attendance by a mix of traditional authorities, opinion leaders (e.g., imams, teachers), and other community members who mainly observed. Focus groups lasted approximately two hours and were guided by two standardized questionnaires, one pertaining to community forestry (indicators 3–7) and one pertaining to fire management (indicators 8–10). Discussions took place in the community’s dominant language using a translator who also spoke English or French. I captured data by taking hand-written notes that I later analyzed and synthesized into descriptive write-ups. I also conducted informal interviews with landowners who donated community forest land in each case-study community to inquire about motivations and impacts. The presence of a few STEWARD staff during focus groups helped supplement, clarify, and verify information received. However, community members may have felt constrained in talking openly with them (and me) present.

4.1.2. Evaluation

The final evaluation assessed whether improved natural resource management occurred under community forestry – potentially fostering biodiversity conservation – and costs and benefits to communities of community forestry and fire management. Evaluation methods appear in [Table 2](#), column 4. I visited 25 communities (two in PZ1 were inaccessible owing to rainy sea-

Table 2
M&E methods for improved natural resource management through community forestry.

Indicator	Description	Monitoring methods (community sample size)	Evaluation methods (community sample size)
1) Area under improved natural resource management	Ha of community forests (CFs) originally established, changes in size over time, reasons for change (2010–2015)	GIS measurements of CFs (n=27, performed by STEWARD technician) Interviews with NGO staff (n=27)	Focus groups (n=25) Interviews with NGO staff (n=27)
2) Progress in establishing CFs	Steps in the process of establishing CFs completed (PZ1=12 steps, PZ2=6 steps)	Interviews with NGO staff (n=27)	Interviews with NGO staff (n=27)
3) Resource access and use	Activities allowed in CFs according to management plans and byelaws, by whom, and changes over time	Review management plans, byelaws, and project documents (n=27) Interviews with NGO staff (n=27) Focus groups (n=6)	Focus groups (n=25) Interviews with NGO staff (n=27)
4) Institutions for community forest management	Governance structures, membership, management activities	Interviews with NGO staff (n=27) Focus groups (n=6)	Focus groups (n=25) Interviews with NGO staff (n=27)
5) Byelaw enforcement	Byelaw compliance, # of transgressions, sanctions imposed on violators	Interviews with NGO staff (n=6) Focus groups (n=6)	Focus groups (n=25)
6) Benefits of CFs	Perceived benefits of CFs to communities	Focus groups (n=6) Landowner interviews (n=6)	Focus groups (n=25)
7) Drawbacks of CFs	Perceived drawbacks of CFs to communities	Focus groups (n=6) Landowner interviews (n=6)	Focus groups (n=25)
8) Fire management practices	Fire management activities undertaken to protect CF from bushfire	Focus groups (n=6)	Focus groups (n=25)
9) Fire occurrence in community forests	Number of times bushfire occurred in CF during project implementation phase	Interviews with NGO staff (n=6) Focus groups (n=6)	Focus groups (n=25)
10) Benefits and challenges of fire management	Perceived benefits and challenges of activities to control bushfire	Focus groups (n=6)	Focus groups (n=25)

son road conditions) where I conducted two focus groups per community using standardized questionnaires: one with FMCs and forest monitors, one with fire brigades. Focus groups with FMCs and forest monitors included questions about the status of the community forest in each community, community forest management and governance, byelaw compliance and enforcement, and impacts of the community forest on community members and landowners who donated the land (Table 2, indicators 1, 3–7). Focus groups with fire brigades included questions about how communities managed and responded to bushfire pre-and post-STEWARD, fire management byelaws and enforcement, fire occurrence in the village and community forest prior to and during the STEWARD project, and benefits and challenges of improved fire management (Table 2, indicators 8–10). I captured data from each focus group electronically on questionnaire forms by community, and later compiled and analyzed responses. In addition, I conducted structured interviews with the relevant NGO staff to assist me in evaluating indicators 1–4.

4.2. M&E of livelihood investments

4.2.1. Monitoring

I also monitored three indicators associated with STEWARD livelihood investments (Table 3, columns 1 and 2) using methods listed in column 3. I conducted semi-structured interviews (Bernard, 2006) with lead CARE and AUDER staff during field visits to learn about different livelihood investments and who they targeted (Table 3, indicator 11), capturing descriptive data in field notes. I also conducted structured interviews with them twice annually to identify where each activity had been introduced or discontinued, and tracked its status over time in an Excel spreadsheet. I monitored drawbacks and benefits of each livelihood investment in the six case-study communities (Table 3, indicators 14–15) during field trips. Livelihood activities were conducted in groups. In each community, I held separate focus groups with available participants from each livelihood group, using a translator. Focus groups lasted approximately 30 minutes and were guided by a standardized questionnaire that asked about the activity, participants, progress, and drawbacks and benefits associated with it. I recorded the data in hand-written field notes and later synthesized and analyzed them.

4.2.2. Evaluation

The final evaluation of livelihood investments assessed the three indicators described above and two additional ones. The latter two estimated household participation levels in livelihood activities to gauge the extent of their potential impact. I relied on people's perceptions of impacts; other M&E methods were used

to measure household-level impacts, but this proved challenging (Polasky and Charnley, 2016). Evaluation methods are indicated in Table 3, column 4.

I conducted structured interviews with lead NGO staff to identify livelihood activities that persisted in each community as of the project's end, recording information in an Excel spreadsheet (Table 3, indicator 11). I evaluated household participation in these activities (Table 3, indicators 12–13) using a random sampling approach that included five communities in PZ1-Sierra Leone, four in PZ1-Guinea, and five in PZ2 (52% of study communities). Case-study communities were not included. I trained two NGO staff in each PZ to administer a household participation survey in sample communities. Between November 2015 and January 2016, surveyors visited every village household and documented whether any member was involved in a STEWARD livelihood activity between 2012 and 2015 (yes/no). They then surveyed every third house (spatially determined) to record the activities household members had participated in. If the third household was non-participating, they asked why not, and proceeded to the next participating household. The survey also asked how the STEWARD project had helped their household or community (Table 3, indicator 15). A total of 482 surveys were completed (247 in PZ1-Sierra Leone, 93 in PZ1-Guinea, 142 in PZ2), representing one-third of all households in the sample communities. The survey was administered in hard copy using the local language and the data entered into Excel in English for analysis.

I also held focus groups with livelihood group participants in the six case-study communities to evaluate impacts (Table 3, indicators 14–15). Questions investigated group membership, activities conducted, how participants had benefited, successes, drawbacks, and future prospects. I recorded the data electronically in questionnaire forms by community, and later compiled and synthesized results.

4.3. Follow-up assessment

I visited the 27 study communities during the follow-up assessment with logistical and research support from AUDER and two former CARE staff. FMCs, forest monitors, and fire brigades remained largely intact with their original membership. I held two focus groups in each community: one with FMCs and forest monitors, and one with fire brigades. The former addressed current status of the community forest and its management institutions, reasons for any changes, management activities undertaken since STEWARD ended, ongoing byelaw compliance, benefits and challenges of maintaining the community forest post-STEWARD, and reasons for doing so (or not). Focus groups with fire brigades investigated their current status, fire management activities, fire occur-

Table 3
M&E methods for livelihood investments.

Indicator	Description	Monitoring methods (community sample size)	Evaluation methods (community sample size)
11) Activities implemented	Livelihood activities introduced by NGOs in each community and duration	Interviews with NGO staff (n=27)	Interviews with NGO staff (n=27)
12) Household participation rates	Number and percentage of households that participated in at least one STEWARD livelihood activity, 2012–2015		Household survey using random sampling approach (n=13)
13) Participation by activity	Number and percentage of participating STEWARD households that engaged in each livelihood activity		Household survey using random sampling approach (n=13)
14) Drawbacks of livelihood activities	Social and economic drawbacks to household or community of participation in each livelihood activity	Focus groups (n=6)	Focus groups (n=6)
15) Benefits of livelihood activities	Social and economic benefits to household or community of participating in each livelihood activity	Focus groups (n=6)	Focus groups (n=6) Household survey using random sampling approach (n=13)

rence post-STEWARD, and why fire management had declined or persisted. I recorded data electronically in questionnaire forms by community and later compiled, synthesized, and analyzed them by topic.

Most livelihood groups disbanded post-project. I held one focus group with available members of current and former livelihood groups, combined, in each of the 27 communities. Questions addressed current status of livelihood activities, benefits received from them post-STEWARD, challenges maintaining them, and why they had declined or endured. I recorded responses electronically on questionnaire forms by community, and later compiled and analyzed responses by activity.

5. Results

To assess whether livelihood investments were effective incentives for community forestry I first present results regarding community forestry and whether it represented improved natural resource management, implying biodiversity conservation benefits. I then present results regarding STEWARD livelihood investments. Results pertaining to the persistence of community forestry 2.5 years post-project, and the influence of livelihood investments on this outcome, follow the same organizational format.

5.1. Community forestry

The STEWARD project aimed to conserve biodiversity by creating community forests, improving forest management and prohibiting most extractive resource uses within their boundaries, and protecting them from bushfire. Doing so was expected to protect species and habitat, avoid deforestation and forest degradation, and encourage tree planting for forest restoration. Implementing NGOs visited communities to “sensitize” them about community forestry and its goals and benefits, and describe livelihood and infrastructure investments associated with the project. Communities chose whether to participate.

NGOs worked with participating communities to establish community forests from 2010 to 2013, using a multi-step process (12 steps in PZ1, 6 steps with multiple sub-parts in PZ2). The order of the steps varied but were comparable in the two PZs and began with outreach and information sharing, identifying potential sites, and consulting landholders about their willingness to donate land. In both PZs, families descended from a village's founders hold long-term tenure over village lands. Family heads allocate rights of resource access and use to residents. NGOs used a participatory process with villagers and landholders to choose community forest locations, guided by several criteria: relatively high biodiversity value (e.g., areas around sacred forest groves or gallery forests); desire to protect ecosystem services (e.g. village water sources); restoration need; potential for developing livelihood activities; and landholder willingness (Momoh, 2013). Once a location was identified, one or more families holding customary tenure over the land transferred it to community tenure via a formal, signed contract. Some areas included forests already protected as sacred or for water conservation following customary practices. Others were mostly savanna grasslands to be afforested by tree planting. Most were secondary forests regrown on farm fallows (Table 4). Landholders interviewed were motivated to donate land by a desire to help their communities benefit from STEWARD livelihood investments, reduce bushfire, and protect forest and water resources for the future.

When the contract was final, resource assessments were conducted, community forest boundaries were delineated, governance structures formed, and management plans were drawn up with

byelaws regarding resource access and use. The final step was to seek official approval for the community forest from relevant government authorities. NGOs provided technical assistance and training for capacity building throughout the process, which often took over a year to complete.

When STEWARD ended in 2015, 27 community forests encompassing 4,249 ha were established across the three study areas (1,037 ha in PZ1-Sierra Leone, 2,948 ha in PZ1-Guinea, 264 ha in PZ2) (indicator 1). Eight communities in PZ1 (three in Sierra Leone, five in Guinea) and two in PZ2 voluntarily expanded their community forest hectareage after initial creation. In contrast, two in PZ1 lost community forest land: one to the Guinean government, which appropriated ~ 150 ha for a military base, and one in Sierra Leone where a landholder decided to take back 75 ha for farming.

In PZ1, all but one community forest (Sierra Leone) completed 11 of 12 steps in the process of community forest establishment (indicator 2). That is, they were formally recognized at the regional government level but not at the national level (step 12). This shortcoming did not affect operations. In PZ2, all community forests completed the six steps required for official establishment. Consultation between NGO staff and relevant government forestry department officials occurred throughout the process mainly for purposes of information sharing. Government staff did not play an active role in community forest establishment or governance, with one exception (a local Guinean forestry department forester took leave to work with CARE in PZ1).

In both PZs, community forests were governed and managed by FMCs, forest monitors, and fire brigades (Fig. 2). Members were elected following nomination at community meetings, or appointed to represent the village's main family lineages. Roughly one-quarter to one-third of members were women, varying by village. Membership by ethnic minorities was minimal in PZ1-Guinea and largely absent in PZ1-Sierra Leone and PZ2. FMCs, forest monitors, and fire brigades worked closely with NGOs who provided training, capacity building, and equipment to help them perform their roles (Table 5). In addition, forestry groups formed in PZ2 to build nurseries, cultivate wild and commercial tree seedlings, and plant them in community forests and plantations in cooperation with FMCs. None received monetary compensation for their work. Focus groups and interviews with NGO staff indicated that with NGO support, governing bodies learned to perform their roles effectively (indicators 4, 8) and were limited mainly by lack of sufficient inputs from STEWARD, i.e., equipment, seedlings, protective gear.

Byelaws were largely consistent across study areas and excluded most extractive uses (indicator 3) (Table 4). Data obtained through focus groups and interviews with NGO staff indicated that byelaw compliance was generally high, though some infractions occurred (indicator 5). Focus groups with FMCs and forest monitors reported seven total cases of byelaw transgression by village residents between 2012 and 2015 in which violators were caught and punished. Violations included illegal honey harvesting and illegal logging in PZ1, and hunting and starting a fire that burned into a community forest in PZ2. Focus group participants explained high byelaw compliance by fear of sanctions, typically fines paid to the FMC plus food donations to feed community forest work parties. Another reason was availability of forestland outside community forest boundaries where residents could conduct activities prohibited in community forests.

Infringements occasionally occurred by people not caught, both residents and non-residents, though impacts were generally considered minor. The most common were cutting small trees for construction in PZ1-Sierra Leone, livestock grazing in PZ1-Guinea, and wood cutting and livestock grazing in PZ2. In some communities where traditional village leaders were not members of FMCs, byelaw violations were referred to them by FMCs to impose sanctions.

Table 4
Community forest characteristics.

Study area	Size of CF	# Families donating land	Dominant forest type and former land uses	Activities permitted	Activities prohibited
PZ1, Sierra Leone (n=9)	7–358 ha (average=115 ha)	1 to 4	Mature forest protected by community as sacred forest (n=1) Mature forest protected by community in watershed where stream provides dry season water source plus secondary forest previously used for farming (n=3) Secondary forest previously used for farming (i.e., rice, groundnuts, cassava, peppers) and sometimes settlement (n=5)	Water collection Tree planting Religious ceremonies Honey production from improved beehives Swamp farming (n=1) Some NTFP gathering (if non-destructive) Tree cutting for community construction projects (n=1) Same as above plus livestock grazing in 3 communities with Fula or Malinke residents (agropastoralists) Tree cutting for community construction projects (n=2) Tree planting NTFP harvesting (for medicinal plants) Farming in savanna grassland (n=1) Tree cutting for community construction projects (n=3) Religious ceremonies Water collection	Logging/tree cutting Mining Hunting Livestock grazing Charcoal production Swidden agriculture Fuelwood gathering Fire use Traditional honey production Same as above
PZ1, Guinea (n=9)	39–708 ha (average=443 ha)	1 to 4	Secondary forest previously used for farming (i.e., rice, groundnuts, cassava, millet, peppers) (n=9)		
PZ2, Guinea (n=9)	2–68 ha (average=29 ha)	1 to 7	Mature forest protected by community as sacred forest plus secondary forest formerly used for tree plantations (i.e., coffee, cacao, kola) (n=4) Secondary forest previously used for tree plantations and farming (n=1) Savanna grassland previously used for rice cultivation (n=4)		Logging/tree cutting Mining Hunting Livestock grazing Charcoal production Swidden agriculture Fuelwood gathering Fire Use Traditional honey harvesting

Corrupt interactions between village members and village leaders in which the former paid the latter not to impose sanctions for violations sometimes occurred in PZ1. In PZ2, most reported byelaw violations were committed by non-locals whom FMCs could not control. In one village, livestock herders hired by absentee herd owners from a nearby city grazed livestock in a community forest located in savanna grasslands, damaging trees planted for reforestation. FMC members requested enforcement assistance from local government authorities, but none came, to their frustration.

Preventing bushfire in community forests was a focus of STEWARD's improved natural resource management strategy. During the project period, wildfires reportedly burned into nine community forests in PZ1 and three community forests in PZ2, but were extinguished before burning much area (indicator 9). Focus groups with fire brigades indicated that this was an improvement; before STEWARD people let bushfires burn in forests and only protected farm fields, tree plantations, and village centers.

The distribution of costs and benefits of community forestry among community members was unequal. Costs (indicator 7) accrued mainly to landholders who donated land for the community forest; FMC members, forest monitors, and fire brigades who invested time and labor establishing, maintaining, and managing community forests; and community members who lost access to resources owing to prohibitions on resource use.

Costs to landholders were reportedly small. Community forests with core areas historically protected were already off limits to most extractive uses. Many were established in secondary forests that were former farmlands lying fallow, or in old or current agroforestry plantations. Landholders interviewed and focus group participants in PZ1 did not consider land to be in short supply. In PZ2, community forests are small owing to greater demand for farmland. Landholders in 2 of 27 communities (one in PZ1-Sierra Leone, one in PZ2) reported difficulty finding alternate farmland but eventually did. Landholders retained tenure over trees they planted on land that became community forests and continued to harvest their products. Nevertheless, in all three study areas, there were cases where an original landholder tried to reclaim community forest land for personal use.

FMCs, forest monitors, and fire brigades bore heavy costs. They regularly complained during focus groups about the lack of financial compensation or recognition for performing an important, time and labor-intensive, role on behalf of their communities. The equipment they received to do their jobs wore out before the project ended. This lack of support created resentment and made it difficult to remain motivated.

Three communities in PZ1-Sierra Leone reported that residents had difficulty obtaining resources previously harvested from community forests, specifically nontimber forest products (NTFPs) and firewood. In PZ1-Guinea, three communities said community forests had displaced herders from grazing areas, making it difficult for them to obtain livestock forage. In PZ2, some farmers who previously cultivated community forest land had trouble finding new farmland.

Focus group members identified the main benefits of community forestry (indicator 6) as ecosystem services and STEWARD livelihood investments. Community forests generated no direct revenue apart from fines for breaking byelaws, a rarity. A STEWARD pilot project determined payments for generating carbon offset credits through community forestry were not tenable (Bioclimate, 2016). Ecotourism potential is low owing to remoteness, poor roads, lack of transportation, and lack of infrastructure. Focus group members reported financial benefits from sale of commercial NTFPs, where harvest was permitted (mainly PZ1-Guinea). Some community forests harbored STEWARD beehives, and beekeepers sold the honey. In PZ2, forestry group members who planted commercial trees in community forests anticipated getting

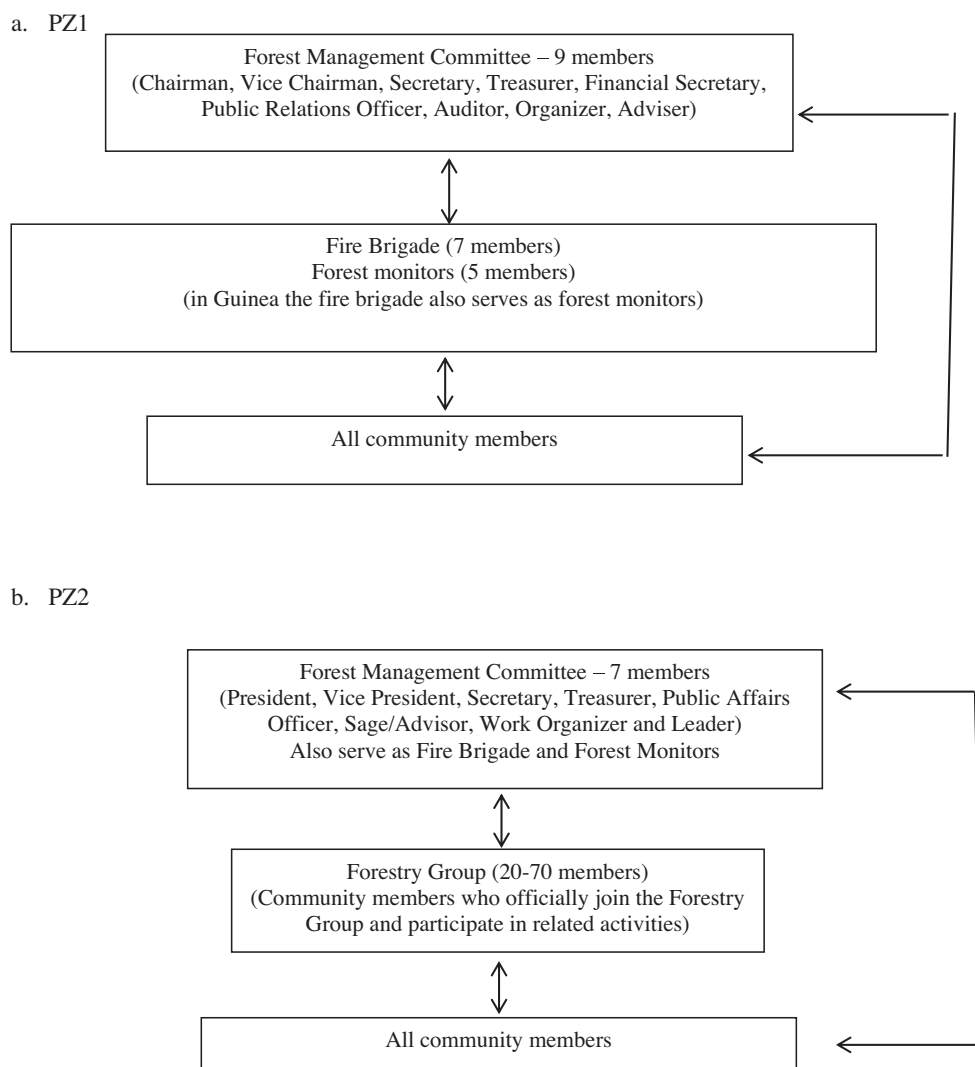


Fig. 2. Structure of community forest management institutions.

Table 5

Roles and responsibilities of FMCs, Forest Monitors, and Fire Brigades¹.

Group	Roles & responsibilities
Forest Management Committee	Manage community forest, organize and coordinate activities there (e.g., tree planting), participate in work activities Develop, review, and enforce community forest byelaws Oversee Fire Brigade and Forest Monitors Raise and manage money for protection and management of forest Support and endorse land contract with landowners Sensitize community about the community forest and its importance Interact with external organizations and visitors concerned with forest conservation & management, give tours of community forest
Forest monitors	Patrol and monitor community forest and surrounding area on a routine basis Ensure that byelaws are being followed, and report or apprehend anyone who breaks them or harms the community forest Become familiar with the community forest, its structure and composition, and gather information about it Participate in management activities and work parties; work with Fire Brigade to patrol for fires and assist with fire belt construction Serve as guides to assist visitors (e.g., tourists, researchers) with their work Provide input to FMC on forest management issues Keep trails clear Sensitize community about the community forest, byelaws, and threats
Fire Brigade	Protect the community and natural resources from wildfire Carry out fire prevention activities, e.g. oversee and participate in construction of fire belts around community forests Inform community when a fire occurs and mobilize residents to help fight it Report and apprehend anyone who starts an uncontrolled fire Sensitize community about fire management and byelaws; educate residents about fire protection and prevention methods

¹ The three groups are separate in PZ1-Sierra Leone; Forest Monitors and Fire Brigades are combined in PZ1-Guinea; FMCs in PZ2 play all three roles.

income from them in the future. Otherwise, communities did not obtain income from community forests (unless illegally).

During the final evaluation, FMC members in six communities in PZ1-Sierra Leone, eight in PZ1-Guinea, and six in PZ2 identified ecosystem services from community forests that benefit their communities. Several community forests were established in places containing streams that provide a dry season water source not previously protected. There, community forests are valued for water catchment, increasing water flows, and water security. Reported climate benefits from community forests include shade, temperature regulation, rainfall, and wind protection. Community forests were also valued for protecting wildlife habitat and NTFPs through avoided deforestation, reducing bushfire, and improving soil and air quality.

Fire brigades identified benefits associated with the training they received in improved fire management (indicator 10). They applied skills learned for building fire breaks to protect their farms, tree plantations, and community cemeteries from bushfire. They also felt better prepared to protect villages from bushfires. The main costs reported were the labor invested in fire management that took time away from personal livelihood activities, and potential injuries that could be sustained when fighting fire or conducting fuels management owing to lack of protective gear.

5.2. Livelihood investments

STEWARD introduced a variety of livelihood investments in communities with community forests (Table 6). It was understood that livelihood investments went hand-in-hand with creating and maintaining a community forest or participating in co-management of a nearby government forest reserve, though no formal agreements made the former contingent on the latter.

Livelihood investments were implemented concurrent with community forest establishment.

To benefit from livelihood investments, individuals had to join a group associated with the activity, commit time and labor to develop it, and experience desired outcomes. In theory, group participation was open to all adults, though some were gender focused and group size sometimes limited. Not all activities were introduced in all communities because STEWARD did not have enough resources to do so. NGO staff determined which activities to implement where based on capacity, village requests, and potential for success, using their judgment. An average of 3.6 activities per village were introduced in PZ1-Sierra Leone, 3.6 in PZ1-Guinea, and 4.1 in PZ2 (indicator 11). The most widespread activities in PZ1 were Village Savings and Loan Associations (VSLAs), market gardening, and beekeeping. VSLAs, rice and fish ponds, and tree nurseries and plantations were the most common in PZ2.

Not all activities remained operative at the end of the study period. At the time of the final evaluation, an average of 2.7 activities per village in PZ1-Sierra Leone, 3.2 in PZ1-Guinea, and 3.2 in PZ2 persisted. The drop in PZ1-Sierra Leone reflects a decline in market gardening, beekeeping, and community tree plantations that either burned in bushfires or were not maintained. In PZ1-Guinea, the drop largely reflects a decline in market gardening. In PZ2, the change was caused mainly by cessation of market gardening and forestry groups associated with community forests in savanna grasslands plagued by poor soil and bushfire.

The percentage of households that participated in STEWARD livelihood activities (indicator 12) in sample villages varied widely, ranging from 42% to 100% (Table 7). Smaller villages tended to have higher participation rates. It was common for participating households to engage in more than one activity (indicator 13). VSLAs were by far the most popular activity (Table 8).

Table 6

Livelihood and infrastructure investments in Priority Zones 1 and 2. Not all activities took place in all communities.

Activity	Description
	PZ1 & PZ2
Market Gardening Groups	Collective gardening groups of women (20–30 in PZ1, 8–56 in PZ2) who share the labor of growing vegetables, sold in nearby markets. The group received training and improved seed varieties from STEWARD. Group members decide how to spend earnings.
Village Savings and Loan Associations (VSLA)	Local savings and loan groups of ~30 persons, usually women, each who contribute money to a communal savings account managed by elected officials from within the group. Members take loans from the account, which they pay back with low interest. At the end of a cycle (~12 months), “sharing out” occurs and people receive back the money they contributed plus a share of the interest.
Improved Beekeeping	Honey harvester groups, almost exclusively male, form and receive training in improved beekeeping techniques, a small number of Kenyan beehives, and equipment for harvesting honey without fire use. Group members use harvested honey for household consumption, and sell the excess, dividing the proceeds.
Water Development	Three kinds of water developments took place: wells pumped by solar water towers, improved manual water pumps at pre-existing well sites, and spring box construction at streams with gravity-fed pipe systems carrying water to several communal water faucets in villages.
Sanitation & Hygiene	Education about sanitation and hygiene was provided and some pit latrines and shower stalls (no running water) constructed.
	PZ1 only
VSLA Conservation Projects	Training about natural resources and conservation took place at weekly VSLA meetings, where conservation-oriented projects were introduced. These included improved cook stoves, composting, planting <i>Moringa oleifera</i> trees for live fencing and other benefits, and inter-cropping. Uptake was mixed.
Community Tree Plantations	Community tree plantations were established for commercial and locally-used species (e.g., cashew, teak, <i>Acacia</i> , <i>Gmelina</i> , <i>Moringa</i>) with community labor. STEWARD provided tree seedlings. Plantations are maintained by community members, organized by FMCs.
	PZ2 only
Tree Nurseries/ Tree Plantations	Tree nurseries for native and commercially-valued varieties (e.g., kola, oil palm, rubber, coffee, cacao) were constructed in all nine communities and maintained by forestry groups who share the labor and economic benefits of nursery activities. Forestry groups averaged 15 people in size, both men and women. STEWARD supplied nursery materials, seedlings, and training. Seedlings were planted in community forests, community tree plantations established by group members, and individual plantations.
Rice and Fish Ponds	STEWARD provided technical assistance and materials to create rice and fish ponds in eight communities, built and managed by cooperative groups of men and women. Communities built between 1 and 7 ponds for a total of 21 constructed. Rice and fish harvested, and proceeds from any sales, are divided among group members.
Livestock Rearing	STEWARD provided training in improved animal husbandry, materials for constructing livestock pens, and pigs or goats to livestock rearing groups (all male) in two communities.

Table 7

Levels of household participation in at least one STEWARD livelihood activity.

Study Area	# of households/village (average and range)	Percent of village households participating (average and range) ¹
PZ-1 Sierra Leone (n=5 villages)	150 (39–270)	59% (42% to 85%)
PZ-1 Guinea (n=4 villages)	70 (39–96)	83% (67% to 100%)
PZ-2 (n=5 villages)	87 (31–124)	74% (58% to 100%)

¹ Based on random sample of one-third of village households.**Table 8**

Percent of STEWARD participating households that engaged in widespread livelihood activities.

Activity	Percent participation, average and range ¹
<i>PZ1-Sierra Leone (n=5 villages)</i>	
Market gardening	18% (9–20%)
Beekeeping	10% (2–36%)
VSLA/VSLA conservation projects	88% (80–100%)
<i>PZ1-Guinea (n=4 villages)</i>	
Market gardening	26% (14–69%)
Beekeeping	17% (8–27%)
VSLA	84% (75–100%)
<i>PZ2 (n=5 villages)</i>	
Market gardening	30% (23–50%)
Rice & fish ponds	21% (3–50%)
Forestry group	32% (12–90%)
VSLA	96% (89–100%)

¹ Figures given for villages where the activity occurred; activity was not introduced in all villages.

Overall participation was highest in PZ1-Guinea. According to the survey, the main reasons for lack of household participation in both PZ1 and PZ2 were having settled there recently, being “foreigners”, lack of social connections, and lack of available household labor. Despite more numerous activities in PZ2, lower participation there may be attributed to the high number of immigrant households, who often experienced barriers to participation. Since the 1990s, PZ2 has been a receiving area for refugees from Liberia, Sierra Leone, and Côte d'Ivoire fleeing civil wars (Van Damme, 1999). PZ2 villages often imposed a set of criteria for joining FMCs and livelihood groups that included being a stable community resident with deep knowledge of the community and local traditions. Some forestry groups only welcomed members with existing private tree plantations or a serious intent to create one. Immigrant households surveyed for a separate study (Polasky and Charnley, 2016) often indicated that they lacked the social networks to be invited to participate in STEWARD, and felt unwelcome or excluded. Immigrants were rarely members of community forest governance structures and were not regular participants in village meetings, so were not well informed about the project.

Not all investments yielded the desired benefits, and the amount of time and labor required to participate given limited benefits created an unfavorable cost/benefit ratio for most activities (indicators 14, 15). This focus-group finding was consistent across study areas. Market garden groups had mixed success. The main benefits were learning new farming techniques and skills that participants could apply to individual market gardening activities post-STEWARD. Material benefits such as income generation and improved seed production varied by crop, community, and year. Crop invasion by wildlife and livestock, inauspicious site conditions, limited market access, lack of storage and preservation facilities, shortages of seeds and gardening tools, and high labor investment with poor financial returns were drawbacks that limited the success of this activity.

Beekeeping groups also had mixed success. One benefit of Kenyan bee boxes is avoiding fire use and tree harvesting, both prac-

ticed in traditional beekeeping. Group members reported that Kenyan beehives lasted longer and produced more and better-quality honey than traditional hives, with economic benefits. However, participation was limited by the low number of boxes introduced, and some boxes burned, broke, or were confiscated by an individual group member. The activity proved unsuitable in PZ2, where beekeeping is uncommon and bees are scarce.

Rice and fish ponds in PZ2 required a major investment of labor for construction and maintenance, though were largely successful, providing both rice and fish to group members for home consumption and sale (though quantities were low). Livestock rearing was introduced in two communities in PZ2. One community received three goats that disappeared during the ebola virus disease outbreak. The other received three pigs that had multiplied by the project's end, but had not been sold.

Only two livelihood activities were considered highly successful and consistently deemed worth the effort. Forestry groups in PZ2 learned to make tree nurseries, improved skills for commercial tree crop production, established community tree plantations, and received improved varieties of tree seedlings to plant in individual plantations. Despite high labor demands and a three to five-year wait for trees to produce, forestry group members were optimistic about the income they would eventually receive and highly valued this activity. VSLAs in both PZs had many benefits and few if any drawbacks. Participants built capacity for money saving and management, gained access to capital at low interest rates (~5–10% versus ~50% at banks), had access to emergency funds, received a share of the interest paid, invested in individual income-generating activities such as small businesses or agriculture, and had funds for group projects.

5.3. Livelihood investments as incentives for community forestry

Based on the indicators, forest management within community forests improved during the STEWARD project, with presumed benefits for forest biodiversity conservation. Community forests were established on 4,249 ha, the majority of which would otherwise be used for swidden agriculture. Swidden agriculture does not inherently reduce biodiversity and can help conserve it (Padoch & Pinedo-Vasquez, 2010), but STEWARD aimed to reduce deforestation for this purpose. Byelaws curtailed extractive activities such as hunting and tree harvesting in community forests, with high rates of compliance. USAID did not consider the potential biodiversity impacts of displacing extractive activities to other forests. Tree planting/ reforestation using both native and commercial species took place inside community forests, especially those with savanna components. Forests traditionally protected as sacred or for water conservation often became part of community forests that expanded spatially, creating a buffer zone around them. Community forests were better protected from bushfire.

For livelihood investments to serve as an effective community forestry incentive, their benefits should outweigh costs. Household participation rates in STEWARD livelihood activities varied by community; some activities failed in some communities; and most activities had mixed success, with few providing consistent bene-

fits and some only future benefits. Nevertheless, the hope if not the reality of benefits from livelihood investments appeared to be effective incentives for community forestry during the project period, with additional benefits anticipated from water infrastructure development. All provided opportunities to learn and gain new skills to apply to individual livelihood endeavors. During the final evaluation, FMC members in three communities in PZ1-Sierra Leone, three in PZ1-Guinea, and five in PZ2 stated that STEWARD livelihood activities were important benefits of community forests. Intrinsic incentives for community forestry associated with ecosystem service provision, which all community residents could benefit from, were also important.

The biggest costs of community forestry were borne by FMCs, forest monitors, and fire brigades. Although they received no direct compensation, they were active participants in livelihood activities. Other costs were offset by availability of forestland outside community forests. Technical assistance from the ongoing presence of NGO personnel in the three study areas during 2012–2015 supported community forest maintenance, management, governance, and livelihood investments. The longer-term sustainability of community forestry once the project ended remained uncertain, however.

5.4. Follow-up assessment

5.4.1. Community forestry

In mid-2018, all 27 community forests across the three study areas continued to be recognized by community members, though in name only in one Sierra Leone community where former uses had resumed. All retained their 2015 size except where the Guinean government had exercised eminent domain. Community forests were partially destroyed in three PZ2 villages to construct an international roadway to Côte d'Ivoire. Additional destruction was anticipated in two PZ1-Guinea community forests by a planned electrification project. FMCs, forest monitors, and fire brigades remained intact but conducted little management or monitoring owing to the lapse in project support.

What had changed were community forest uses. In several communities, some previously prohibited activities were now allowed, particularly farming, cattle grazing, and tree harvesting. These changes were unofficial (byelaws and forest management plans remained the same) but were sanctioned by FMCs. Community forest byelaws became more permissive in six communities in PZ1-Sierra Leone, nine in PZ1-Guinea, and two in PZ2 (Table 9). Extractive activities also increased in some community forests where they were not sanctioned by FMCs and considered illegal.

In PZ1-Sierra Leone, one original community forest landholder farmed in swamplands in a community forest where it was not previously allowed. In another, swidden agriculture was permitted by any community member. The FMC in one community relaxed restrictions on tree cutting by community members for personal use to accommodate local needs. Four communities allowed grazing in their community forests, though livestock rarely grazed there.

There is an aggressive commercial timber trade in Sierra Leone (Munro & Hiemstra-van der Horst, 2011; Munro & van der Horst, 2012), including in PZ1. Timber buyers from Freetown travel to villages and negotiate directly with landholders whose lands contain desired tree species (e.g., *Pterocarpus*), and who are the financial beneficiaries of timber sales. Most timber sales occur outside community forest boundaries. However, one community allowed commercial timber harvesting within its community forest, and unsanctioned timber harvesting was reported in two community forests – intentionally and illegally, or by accident. FMCs did not have the capacity to enforce byelaws prohibiting commercial timber harvesting and received no enforcement support from government authorities.

By 2018, one additional community in PZ1-Guinea allowed farming in swampland inside its community forest, and two allowed tree harvesting by community members for personal use. The biggest byelaw changes pertained to grazing and commercial tree harvesting. Demand for grazing in community forests is high among resident agropastoralists, especially in the dry season. Grazing had become an accepted land use in all nine community forests because FMCs felt it was impractical to exclude livestock. Community forests are unfenced, forest monitors lack capacity and incentive to exclude livestock, and animals often wander without herders. The commercial timber trade is less active in Guinea than Sierra Leone, but FMCs in four PZ1-Guinea communities began allowing commercial timber harvesting. Unlike Sierra Leone, harvests were driven by community cash needs, such as building schools or healthcare facilities and maintaining mosques. FMCs calculated how much money was needed for a community project and sanctioned the harvest of an equivalent number of trees by timber buyers based on an agreed upon stumpage value. Harvests proceeded without a forest management plan; harvesters decided which trees to cut, with limited oversight.

In PZ2, farming was permitted in one community forest where it was not previously allowed. There, two original landholders tried to reclaim community forest land post-STEWARD by undertaking swidden cultivation of manioc. They reached a compromise with the FMC allowing them to plant coffee instead, with individual tenure rights to coffee trees. One community allowed three trees to be cut and sold from their community forest to obtain funds for repairing their STEWARD water development. Unsanctioned grazing now occurred in four community forests dominated by savanna grasslands, compromising afforestation efforts. As previously, herders were non-local, reportedly employed by absentee herd owners from urban areas. FMCs could not enforce grazing byelaws among non-residents without external government support, which they requested but was not forthcoming.

5.4.2. Livelihood and infrastructure investments

If STEWARD livelihood and water infrastructure investments provided sustainable benefits to communities post-project, these might continue to incentive community forestry. Table 10 indicates the status of these investments mid-2018. In PZ1-Sierra Leone and PZ1-Guinea, VSLAs continued to operate and provide

Table 9
Change in number of community forests allowing extractive activities, 2015 to 2018.

Harvest Activity	PZ1–Sierra Leone		PZ1–Guinea		PZ2		Total	
	2015	2018	2015	2018	2015	2018	2015	2018
Farming ¹	1	3	3	4	1	2	5	9
Grazing	0	4	3	9	0	0	3	13
Tree harvest, resident	1	2	2	4	3	1	6	7
Tree harvest, commercial	0	1	0	4	0	1	0	6
Total	2	10	8	21	4	4	14	35

¹ Does not include planting trees for community benefit (e.g., kola, coffee, cacao, oil palm).

Table 10
Status of STEWARD livelihood investments and water infrastructure mid-2018.

Activity	PZ1-Sierra Leone		PZ1-Guinea		PZ2	
	# Villages received	# Villages persisted	# Villages received	# Villages persisted	# Villages received	# Villages persisted
VSLA groups	9	7	9	8	9	9
Market gardening	8 (groups)	2 (groups) 6 (HHs) ¹	8 (groups)	6 (HHs)	7 (groups)	4 (groups) 6 (HHs)
Improved beekeeping	8	3	8	2	3	1
Community tree plantations	6	1	7	5	5	4
Forestry groups	0	n/a	0	n/a	9 groups 9 group nurseries	7 groups 4 group nurseries
Rice and fish ponds	0	n/a	0	n/a	8 villages, 21 ponds	6 villages, 18 ponds
Livestock rearing	0	n/a	0	n/a	1 village, 3 pigs; 1 village, 3 goats	1 village, 38 pigs 0 goats
Water development	8	3	9	5	7 villages, 9 wells	6 villages, 4 wells

¹ HHs = activity continued by individual village households instead of groups.

community benefits. Where discontinued, members lacked funds to donate or did not repay loans. Market garden groups disbanded in most communities, but market gardening persisted at the household level in six communities in Sierra Leone and six in Guinea. Reasons cited for discontinuing it were livestock damage, water shortages, lack of seeds, and insects. Improved beekeeping by honey harvester groups also stopped in most PZ1 communities. Problems encountered were honey theft, abandonment by bees, breakage, burning in bushfires, and destruction of harvest equipment. Where improved beekeeping persisted, individuals maintained bee boxes for personal use. Most honey harvesters in PZ1 reverted to traditional methods. However, in three PZ1-Guinea communities, individuals constructed their own improved bee boxes, and in two, they purchased new ones.

Six PZ1-Sierra Leone communities had received tree seedlings to plant in community plantations. In five they either burned in a wildfire or were not maintained; one still had a partial plantation that had not yet produced products. Community tree plantations in PZ1-Guinea were more successful, persisting in five of seven communities, though no harvest had occurred.

In PZ2, VSLAs and tree plantations were widely regarded as valuable STEWARD project investments that provided community benefits. VSLA groups operated in all nine villages, and all but one added new groups post-project with ongoing low-level support from AUDEP. Community tree plantations were beginning to bear fruit, though one was abandoned because the original landholder's family reclaimed the land. Individual tree plantations were also beginning to bear fruit. Seven of nine forestry groups persisted. They maintained STEWARD nurseries in three communities and built a new nursery in one community to expand coffee, oil palm, and cacao production with seedlings they purchased. Some group members also built individual nurseries to expand their tree plantations.

Most rice and fish ponds continued to operate and were viewed favorably. Lack of maintenance, reclamation by a landholder, and incursion from road development destroyed three. Four of seven market gardening groups persisted and market gardening continued by individual households in six communities. Group membership fluctuated annually, depending on circumstances. The community with a successful livestock project now had 38 pigs, and though none had been sold, believed they would bring future livelihood benefits.

Most communities in PZ1 and PZ2 received one water development, of which there were three kinds (Table 6). Contractors employed to construct the water developments conducted a preliminary assessment to determine which type was best suited to

each village. By mid-2018, roughly half had failed (Table 10) and several that still worked had problems. Solar water tower and gravity-fed systems were largely a failure. Only improved manual water pumps, installed at pre-existing village well sites, were successful – benefiting PZ1-Guinea the most. Communities with successful water developments greatly appreciated them. In communities where they failed, anger and disappointment loomed large.

5.4.3. Community forestry incentives post-STEWARD

The end of STEWARD project support in late 2015 meant communities might no longer continue maintaining community forests with their associated biodiversity benefits, though USAID and partners hoped they would. In 26 of 27 communities, community forestry continued but evolved to better meet the land use and financial needs of communities. Focus groups identified two key reasons for its persistence: the intrinsic value of ecosystem services that community forests provide, and the hope that by stewarding community forests, communities would attract future community development projects from external organizations in reward. However, in PZ1-Sierra Leone, one community abandoned community forestry owing to lack of benefits, and FMCs in two additional communities did not feel compelled to continue protecting community forests for the same reason. They planned to soon allow income-earning activities such as mining and farming.

Focus groups across study areas referenced the intrinsic benefits of community forests. People value forests and wildlife; rely on forest streams for household water needs; value NTFPs for food, medicine, and commercial trade; appreciate their climate benefits; and want to leave a legacy of healthy forests for their children and future generations. Focus group members often cited the future value of trees that could be harvested from community forests following a period of protection and growth. FMC members in all three study areas also acknowledged the connection between conserving community forests and receiving livelihood and infrastructure benefits from STEWARD. In some communities there was an implied, in others an explicit, hope that if they continue to protect community forests, they will attract future donor assistance, development projects, carbon payments, or ecotourism revenue.

Unofficial community forest byelaw changes were least evident in PZ2 (Table 9), where the benefits of STEWARD livelihood projects were most diverse and enduring (Table 10). In contrast, unofficial byelaw changes were common in PZ1, where VSLAs were the main lasting benefit. Where illegal (unsanctioned) extractive activities occurred, prevention was difficult because FMC members, forest monitors, and fire brigades lacked equipment, support, and

compensation for doing their jobs. These findings indicate that, where they produce benefits, livelihood and infrastructure investments have potential to help incentivize community forestry after projects formally end.

6. Discussion

This study investigates community incentives to participate in externally driven and funded community forestry initiatives in Africa. Community forestry under the STEWARD project in Guinea and Sierra Leone provides an example in which livelihood and water infrastructure investments served as in-kind incentives for improved forest management to promote forest biodiversity conservation through community forestry. It occurred on village lands where founding family lineages hold tenure over forests – a relatively common form of customary tenure in West Africa (Berry, 2009; Peters, 2020) – and transferred tenure to the community to establish community forests, with forest management and decision-making undertaken by community governance institutions established for this purpose. Forest tenure was fairly secure vis-à-vis the state, except in the case of eminent domain for military or development purposes. Occasionally, former landholders attempted to reclaim community forest land for individual pursuits, in which case they negotiated solutions with FMCs.

I found that despite mixed success, livelihood investments, planned water developments, and their potential benefits were compelling extrinsic incentives for community forestry during the STEWARD project's lifetime. Success in establishing and maintaining community forests during this period likely contributed to forest biodiversity conservation within community forest boundaries; the project did not address leakage via displacement of forest uses to other areas. The most successful and enduring investments were VSLAs and nurseries where commercial tree seedlings (coffee, cacao, oil palm, rubber) were grown and planted out to individual and community tree plantations, providing tangible financial benefits to participating households. Intrinsic incentives associated with the ecosystem services that community forests provide, and the support of local NGOs in all aspects of project implementation, were also key.

Lasting benefits from some community development investments and a hope for future donor investments incentivized maintenance of community forests 2.5 years post-project in 26 of 27 communities, as did the intrinsic ecosystem service benefits of community forests. Quantifying how much the former versus the latter influenced this outcome is not possible based on data from this study. Customary practices of forest protection, reflecting intrinsic incentives for forest conservation that were present pre-STEWARD, may have made communities more receptive to sustaining protection-oriented community forestry. I found no evidence of “crowding out” associated with livelihood and infrastructure investments (when extrinsic conservation incentives cause intrinsic motivations for conservation to weaken, Ezzine-de-Blas et al., 2019; Rode et al., 2015).

Expecting short-term extrinsic incentives to lead to long-term conservation outcomes is unrealistic (Ferraro & Kiss, 2002; Wunder et al., 2008), especially if projects restrict access to land and resources (Pagiola, Honey-Rosés, & Freire-González, 2016, 2020). The benefits from conservation incentives should outweigh the returns from alternate uses of the conserved area for conservation to persist (Milne & Niessen, 2009; Niessen & Rice, 2004). This balance changed after STEWARD ended, when many communities informally changed community forest bylaws to better meet their land use and financial needs. The greatest changes occurred in PZ1, where lasting benefits from STEWARD livelihood activities were low compared with PZ2. At the extreme, in PZ1-Sierra Leone, one

community abandoned its community forest, opening it to extractive activities, and two others planned to do the same because of opportunity costs associated with agriculture, tree harvesting, and mining. All three communities cited a failure to benefit from STEWARD as justification. When extractive uses began post-project, they did so without a plan for sustainable harvest, pointing to a weakness of protection-oriented community forestry models should management shift.

Thus, post-STEWARD, communities sought to manage community forests in a manner that better balanced their needs, interests, and opportunity costs with biodiversity conservation to benefit themselves and draw the interest of potential future donors. This balance varied by community. Where livelihood investments had longer-term community benefits, the STEWARD community forestry model was better maintained. This finding supports the proposition that incentive-based conservation may persist after project financing ends if intrinsic benefits, or benefits from extrinsic incentives, are sustained over time. Unfortunately, additional research was prevented by the COVID-19 pandemic, making it unclear how community forestry in the study areas has changed since 2018.

This study contributes understanding of when communities will engage in collective action to participate in community forestry initiatives that promote biodiversity conservation in Africa by situating these initiatives within the broader framework of incentive-based conservation. It underscores the importance of providing group incentives that align with community members' interests, and suggests that these incentives vary by context. The STEWARD case and the literature on community forestry incentives in Africa suggest that livelihood and infrastructure investments as a central incentive strategy may be most effective where communities have fairly secure land tenure; and the community forestry model is more protection- than production-oriented, or income-earning opportunities from forest resources are negligible – whether due to restrictions, degradation, lack of market access, or other causes. Where community forestry occurs on state or community lands over which communities have insecure tenure and the state largely controls management decision-making, incentives that increase tenure security and strengthen customary access to, use of, and control over forests are key. Where there is potential to improve revenue generation from production-oriented community forests by establishing sustainable community forest enterprises with equitable benefit distribution, strategies focused on supporting these enterprises can create an effective community forestry incentive. Nevertheless, livelihood and infrastructure investments may provide secondary incentives. These observations highlight the need for pre-project assessments that engage a wide range of community members to determine how their needs and interests can best be served in community forestry projects that entail tradeoffs to meet conservation goals. They also highlight the need for additional research that investigates the conditions under which different incentive types may be most effective for community forestry.

Kerr et al. (2014) suggest that projects offering a wide array of benefit types that are widely distributed are more likely to incentivize collective action for conservation. My findings support this proposition. STEWARD offered several livelihood activities that community members could potentially benefit from if they invested time and labor in participating, and water infrastructure development was intended to benefit all households. Diverse livelihood investments provide opportunities for households to participate in ways that meet their needs, interests, and capacity. They also increase the likelihood of success; if some investments fail to produce benefits, others may, as occurred with STEWARD. There is a risk, however, of spreading project resources too thinly with this approach. When investments largely fail to deliver their

purported benefits, or those benefits quickly fail post-project, not only may conservation dwindle, as this study illustrates; communities may be angry and resentful, and dubious of participating in such projects in the future. These sentiments were palpable during the follow-up assessment in 2018, when focus group participants bitterly complained about failed STEWARD water infrastructure in particular. Failure to effectively deliver the expected benefits of incentive-based conservation makes these schemes another way of exploiting local communities for conservation purposes (e.g., Brockington et al., 2008; Dowie, 2011).

Equity is critical for successful incentive-based conservation projects where collective action is needed (Spiteri & Nepalz, 2006). A weakness of STEWARD and many incentive-based conservation projects was that the costs and benefits of conservation were not equitably distributed, although household participation rates in livelihood activities were high in many communities (averaging 59 to 83 percent across PZs). Households with labor shortages, new to the community, or unaffiliated with the dominant ethnic group and founding family lineages did not experience equal opportunities to participate and benefit. Meanwhile, those who bore the greatest costs of conservation – FMCs, forest monitors, and fire brigades – received no direct or additional compensation. Consequently, illegal uses of community forests rose post-STEWARD when support from NGOs and government officials was also no longer available. Liu and Kontoleon (2018) found with PES projects that incentives involving low transaction costs and high payment rates are important for conservation success in developing countries. Addressing barriers to household participation in livelihood activities, and providing extra compensation (monetary or in-kind) to those responsible for community forest management and governance during the project period, might have improved post-project outcomes.

Incentives are not the only determinants of successful conservation projects, and are insufficient for promoting the success of community forestry in meeting its goals. Information and training to raise awareness and build capacity, and effective institutions for forest management are also critical (Agrawal et al., 2018). Enabling conditions that facilitate successful community forestry, such as secure land tenure, effective forest governance institutions, meaningful devolution of responsibility and authority for forest management to communities, and supportive government policies and programs are also needed (Ribot et al., 2010; Baynes et al., 2015; Hajjar and Oldekop 2018; Charnley et al., 2022).

7. Conclusions

Most community forestry projects in Africa are driven by international donor organizations, conservation organizations, or the state, as are most incentive-based conservation projects. Why do communities participate? Given the potential for community forestry to have positive socioeconomic and environmental outcomes, evaluating incentives for community participation can help inform the design of successful initiatives so that community forestry provides its intended benefits, and those benefits endure beyond initial government or donor organization support. This study improves understanding of whether and under what conditions livelihood investments help serve as effective community forestry incentives, recognizing that incentives alone are insufficient for success.

The STEWARD case highlighted here also builds knowledge of community forestry in Sierra Leone and Guinea, about which there is little published literature. In addition, it contributes a case to the community forestry literature in Africa in which community forests were established by transferring tenure from founding family lineages to the community as a whole, rather than through formal

state devolution of forest management and decision-making to communities. Relatively secure forest tenure and a protection-oriented approach to community forestry made livelihood and infrastructure investments important extrinsic incentives for conservation under STEWARD. Livelihood and infrastructure investments have often been used as conservation incentives in Africa, but their role as incentives for community forestry there is poorly documented.

This study provides a framework for assessing community forestry within the context of incentive-based conservation. It demonstrates that livelihood and infrastructure investments can be effective in-kind incentives for collective action to promote conservation through community forestry in low-income African countries, but emphasizes the need to develop incentives for community forestry that are tailored to the local context. Because the literature on community forestry incentives is limited, there is also a need for future research exploring the relationship between incentive types and community forestry variables such as land tenure and opportunities for community forest enterprises. Where the incentive approach entails livelihood and infrastructure investments, facilitating widespread benefits by offering a variety of investment types can increase opportunities for engagement by community members according to their circumstances and interests, favoring collective action for conservation.

This study also demonstrates that projects that deliver sustainable benefits after support organizations withdraw have potential for continuing to incentivize community forestry and biodiversity conservation post-project, but these benefits must be compelling. In the STEWARD case, ecosystem service benefits from community forests were important but insufficient. Much greater attention is needed on how to design effective livelihood and infrastructure investments that deliver their intended benefits, taking local context into account. Doing so can lead to better conservation outcomes and will avoid exploiting communities that participate in biodiversity conservation initiatives by failing to provide them with meaningful rewards in return.

Authorship contribution statement

Susan Charnley conceptualized this study, was responsible for its administration, led the development of research methods, data collection, and analysis, and wrote the draft and final versions of this article.

Data availability

The data used in this study may be available from the author upon request.

Declaration of Competing Interest

The author declares that she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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