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Payments for Ecosystem Services as a Framework for Community-Based Conservation in Northern Tanzania

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Abstract: *Payments for ecosystem services (PES) are an increasingly promoted approach to conservation. These approaches seek to develop financial mechanisms that create economic incentives for the maintenance of ecosystems and associated biodiversity by rewarding those who are responsible for provision of ecological services. There are, however, few cases in which such schemes have been used as a strategy for conserving wildlife in developing countries and very few operational examples of such schemes of any sort in sub-Saharan Africa. In savannah ecosystems, large mammal populations generally depend on seasonal use of extensive areas and are widely declining as a result of habitat loss, overexploitation, and policies that limit local benefits from wildlife. Community-based conservation strategies seek to create local incentives for conserving wildlife, but often have limited impact as a result of persistent institutional barriers that limit local rights and economic benefits. In northern Tanzania, a consortium of tourism operators is attempting to address these challenges through an agreement with a village that possesses part of a key wildlife dispersal area outside Tarangire National Park. The operators pay the community to enforce voluntary restrictions on agricultural cultivation and permanent settlement in a defined area of land. The initiative represents a potentially cost-effective framework for community-based conservation in an ecologically important area and is helping to reconcile historically conflicting local and national interests relative to land tenure, pastoralist livelihoods, and conservation. Wider adaptation of payments for ecosystem services approaches to settings where sustaining wildlife populations depends on local stewardship may help address current challenges facing conservation outside state-protected areas in savannah ecosystems in sub-Saharan Africa and other parts of the world.*

Keywords: community-based conservation, migratory wildlife, payments for ecosystem services, savannah ecosystems, Tanzania

Pago de los Servicios Ecosistémicos como Marco de Referencia para la Conservación Basada en Comunidades en el Norte de Tanzania

Resumen: *Los pagos de servicios ecosistémicos son un enfoque cada vez más promovido para la conservación. Estos enfoques buscan desarrollar mecanismos financieros que crean incentivos económicos para el mantenimiento de ecosistemas y la biodiversidad asociada recompensando a quienes son responsables de proporcionar esos servicios ecológicos. Sin embargo, hay pocos casos en los que dichos esquemas se han usado como una estrategia para conservar vida silvestre en países en desarrollo y existen muy pocos ejemplos de*

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tales esquemas en África subsahariana. En los ecosistemas de sabana, las poblaciones de mamíferos mayores generalmente dependen del uso estacional de áreas extensas y están en franca declinación como resultado de la pérdida de hábitat, la sobrexplotación y políticas que limitan los beneficios locales a partir de la vida silvestre. Las estrategias de conservación basada en comunidades buscan crear incentivos locales para la conservación de vida silvestre, pero a menudo tienen impacto limitado como resultado de barreras institucionales persistentes que limitan los derechos y beneficios económicos locales. En el norte de Tanzania, un consorcio de operadores de turismo está intentando enfrentar estos retos mediante un acuerdo con una aldea que posee parte del área de dispersión de vida silvestre fuera del Parque Nacional Tarangire. Los operadores le pagan a la comunidad para aplicar restricciones voluntarias al cultivo agrícola y al establecimiento definitivo en una zona definida. La iniciativa representa un marco potencialmente redituable para la conservación basada en comunidades en un área ecológicamente importante y ayuda a reconciliar intereses históricamente conflictivos en relación con la tenencia de la tierra, la forma de vida de los pastores y la conservación. Una mayor aplicación de pagos de los servicios ecosistémicos en sitios donde la sustentabilidad de poblaciones de vida silvestres depende de la participación local puede ayudar a enfrentar los retos de la conservación fuera de áreas protegidas en ecosistemas de sabanas en África subsahariana y otras partes del mundo.

Palabras Clave: conservación basada en comunidades, ecosistemas de sabanas, pagos de servicios ecosistémicos, Tanzania, vida silvestre migratoria

Introduction

Payments for ecosystem services (PES) are a widely and increasingly proposed strategy for developing economic incentives for biodiversity conservation in a range of social and ecological settings around the world (Wunder et al. 2008). Payments for ecosystem services initiatives aim to address market failures whereby the economic values provided by ecosystem services or biological resources are not captured by the individuals or groups who provide those services and who consequently lack incentives to conserve those resources (Engel et al. 2008). The basic conceptual elements of PES arrangements, as defined by Wunder (2007), comprise a voluntary and conditional transaction whereby a defined ecosystem service is purchased by at least one service buyer from at least one service provider. Key concepts in PES arrangements include those of additionality and conditionality (Wunder 2007). *Additionality* means payments made must secure an environmental service that would not have been produced anyway in the absence of those payments. *Conditionality* means payment for the service is conditional on some defined performance criteria that must be met by the providers or sellers. Payments for ecosystem services schemes with these characteristics are also sometimes termed performance payments (e.g., Zabel & Holm-Müller 2008) or direct payments for conservation (Ferraro 2001; Ferraro & Kiss 2002).

Although PES models are being widely promoted as a way of enhancing incentives for biodiversity conservation, there are limited operational examples of these schemes (Wunder 2007). Although some PES schemes have been developed that target the conservation of particular large mammal species in Europe and North America (e.g., Zabel & Holm-Müller 2008), there are few similar initiatives in developing countries. Sub-Saharan Africa has very few operational examples of PES schemes of any kind and only a few poorly documented cases where PES models have been applied to large mammal conservation (e.g., Sikand 2007). Even as PES models continue to garner widespread interest, largely through their application to forest conservation efforts in relation to global climate change concerns, there is a pressing need for documentation of operational PES initiatives and some of the lessons emerging from experimentation in the field.

We conducted a preliminary case study of a novel type of PES arrangement from northern Tanzania, where a consortium of tourism companies has contracted with a local pastoralist village to conserve a key wildlife dispersal area in exchange for annual financial payments. The essence of this agreement is that the tour operators are paying for land in which they have no direct commercial interests, but which is still indirectly of value to their businesses as a result of the land's importance for wildlife. Our case illustrates how PES arrangements can provide a potential framework for community-based conservation of migratory wildlife populations in savannah and grassland ecosystems, where wildlife populations around the world are widely undergoing decline (Berger 2004; Newmark 2008). Although this scheme has only been in place for about 4 years, the initiative provides a novel and potentially cost-effective framework for community-based conservation outside state protected areas. The initiative also demonstrates how negotiated PES arrangements can facilitate new collaborations and common ground in areas with a long history of conflict between community livelihood interests and conservation goals.

Challenges to Wildlife Conservation in East African Savannahs

African savannahs are characterized by semiarid conditions and rainfall patterns with high spatial and temporal

variability (Pratt & Gwynne 1977). This renders mobility a key adaptive trait for both human pastoralist communities and wildlife populations (Scoones 1995). The extensive nature of savannah ecosystems means areas protected by the state generally only cover limited proportions of the total areas used by wildlife (Myers 1972). For example, even in the Serengeti ecosystem, with nearly 30,000 km^2 enclosed within state protected areas, the annual wildebeest migration relies significantly on communal and private lands outside protected area boundaries (Thirgood et al. 2004). The limitation of wildlife movements in savannah ecosystems is consequently a prominent threat to wildlife and has caused major declines in large mammal populations in many parts of Africa (Newmark 2008). For example, a 10-fold increase in commercial wheat farming in lands outside Kenya's Maasai Mara National Reserve is associated with the decline of 58% of resident wildlife and 81% of the Loita plains' migratory wildebeest population since 1975 (Homewood et al. 2001).

The loss of wildlife habitat outside state protected areas is closely tied to the economic incentives that drive land-use decisions on the part of local landholders. In semiarid savannahs, agricultural cultivation is often a marginally productive use of land, but state ownership of wildlife effectively precludes local people from opting for wildlife as a land use. The accumulation of the costs of living with wildlife at the local level and the capture of wildlife's economic benefits elsewhere—mainly by governments or private investors—creates local disincentives to conserve wildlife (Emerton 2001; Norton-Griffiths 2007). Where formal rights to use wildlife have been devolved to the landholder level, such as in a number of southern African countries, there have been widespread recoveries of large mammal populations on private and communal lands (Child 2004).

These experiences have led to widespread experiments with community-based conservation across Africa that attempt to translate wildlife's economic value into local-level incentives for sustainable use (Hulme & Murphree 2001). Such approaches, however, are premised on reforms that grant local landholders rights over wildlife and its economic values (Murphree 1993). Implementing such reforms is inherently challenging because devolution of rights over resources to the local level often conflicts with the interests that policy makers have for maintaining centralized control over valuable resources, particularly in the context of African governance institutions, where informal patronage interests play a major role in policy decisions (Nelson & Agrawal 2008). As a result of these persistent policy distortions, wildlife's economic values often remain inaccessible to local landholders, who consequently continue to convert land to other uses and discourage conservation on private and communal lands (Norton-Griffiths 2007).

Northern Tanzania's Simanjiro Plains

Tanzania's Maasai Steppe covers approximately 35,000 km^2 of the north-central part of the country in the central Rift Valley (Prins 1987). The ecosystem is defined by the movement of wildlife between dry-season refuges with permanent water sources and wet-season dispersal areas on poorly drained volcanic plains (Borner 1985). The most abundant large mammals are wildebeest (*Connochaetes taurinus*) and zebra (*Equus quagga*), both of which move between dry-season and wet-season ranges. During the dry season, these species and other ungulates concentrate along the Tarangire River inside Tarangire National Park (2600 km^2), as do large herds of elephants (*Loxodonta africana*) and buffalo (*Syncerus caffer*).

The most important wet-season habitat for wildebeest and zebra in the Maasai steppe has historically been the Simanjiro plains, which lie between 25 and 40 km to the east of Tarangire National Park (Kahurananga 1981). The seasonal migration is driven by higher nutrient and mineral levels (particularly phosphorus) in the plains' grasses, particularly in key forage species such as *Panicum coloratum* and *Digitaria macroblephara*, which are important for calving and lactating ungulates (Voeten 1999). During the past 10–15 years, wildlife populations in the Tarangire–Simanjiro ecosystem have undergone a substantial decline as a result of habitat loss and illegal hunting (Stoner et al. 2007).

The Simanjiro plains are situated on lands under the authority of local communities. In Tanzania rural communities are administratively divided into villages, which are governed by village assemblies (all the adult residents of the village) and elected village councils of up to 25 members headed by a village chairman. Village councils are corporate bodies capable of owning property, taking legal action, and entering into third-party contracts and are responsible for managing lands within villages' customary or demarcated boundaries. Three villages contain most of the Simanjiro plains dispersal area: Emboreet, Sukuro, and Terrat (Fig. 1).

The residents of these villages are predominantly Maasai pastoralists who manage their lands as a mixture of communal rangelands and individualized properties for homesteads, farms, and kraals for calves. Maasai livestock and range management systems are based on self-regulated spatial and temporal movements and pasture reservation. The aim of these systems is to prevent overgrazing and ensure the provision of resources during vulnerable periods in light of the area's highly variable rainfall conditions (Homewood & Rodgers 1991). Designated communal pastures are shared by village residents, and rules over pasture access are determined and enforced collectively. A central component of Maasai range management is the designation of large areas as dry-season grazing reserves that are generally used only

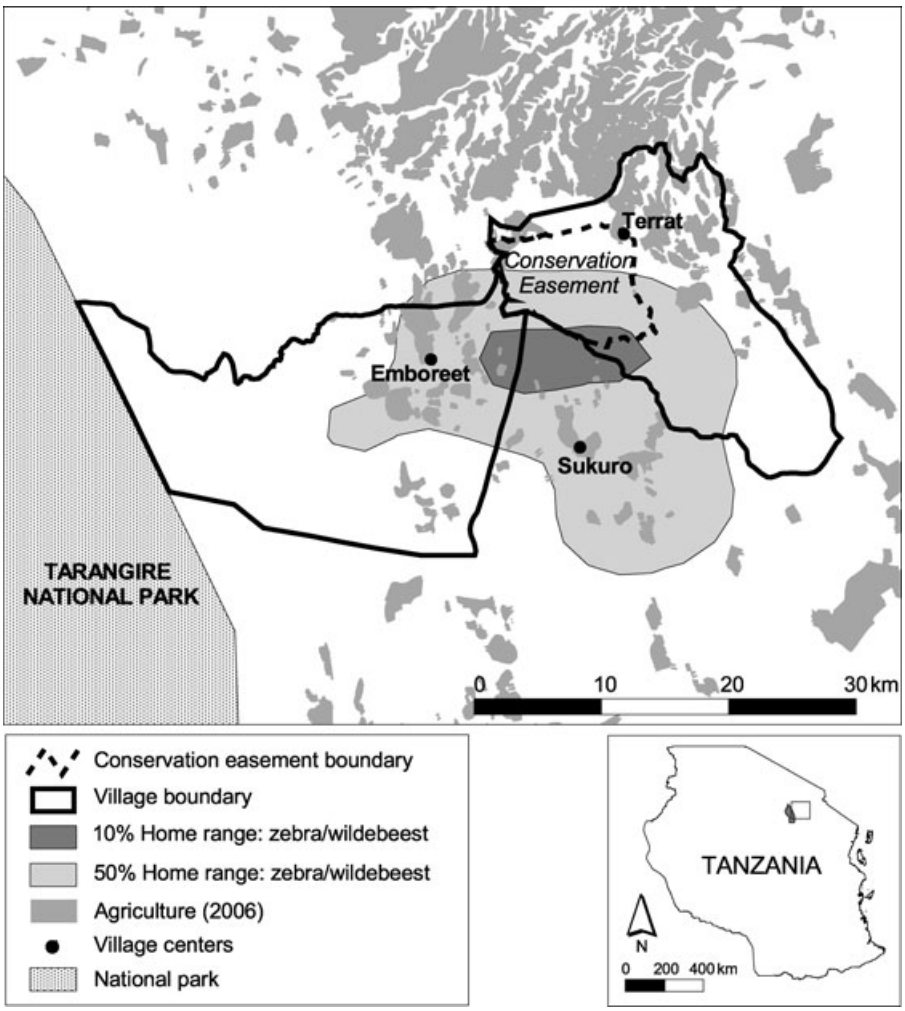

Figure 1. Location of the Simanjiro plains, the key wildlife-migration area east of Tarangire National Park, village boundaries, and area under the payment for ecosystem services agreement in Terrat village. Also shown are the 10% and 50% kernal home ranges for the migratory zebra and wildebeest in the Simanjiro plains relative to agricultural land cover.

during the second half of the long dry season (e.g., around July–October). In the Simanjiro the pasture reservation system is reinforced by the risk of transmission of malignant catarrhal fever, a disease lethal to cattle, from wildebeest to cattle during the wet season.

Although the Maasai traditionally rely predominantly on livestock, they are increasingly using agricultural cultivation as a livelihood strategy. In the Maasai Steppe, the amount of land farmed has increased considerably since the 1970s, with, for example, the area farmed per household in Emboreet village increasing by 45% between 2002 and 2004 alone (Sachedina 2008). These land-use changes are driven by several dynamics. First, as human populations in northern Tanzania's highlands have increased, land scarcity has driven immigration to adjacent semiarid rangelands. Second, the pastoralist economy has deteriorated as a result of increased human populations (and thus lower per capita livestock holdings) and the loss of land, including key dry-season grazing territories, to agricultural projects and state protected areas (Igoe & Brockington 1999). This has led pastoralists to take up cultivation as an increasingly necessary livelihood strategy. Last, pastoralists are also cultivating, particularly in some villages adjacent to Tarangire National Park, as a defensive strategy to prevent more land being appropriated by the state for wildlife conservation (Sachedina 2008). The result of these complex and interacting factors is that an increasing amount of land in the key wet-season dispersal areas for wildlife is being converted to cultivation. Maasai communities face internal trade-offs in allowing pastures to be converted to farming, and there are considerable village-level concerns about the implications of such changing land-use patterns relative to the long-term viability of livelihoods that remain overwhelmingly reliant on livestock production.

Since at least the early 1980s, conservationists have also expressed concern over the loss of wildlife dispersal and migration corridors on community and private lands in the Maasai steppe (Borner 1985). Historically, formal conservation efforts in the region have been characterized by conflicts between local communities and wildlife conservation interests (Igoe 2004), which include government agencies, international nongovernmental organizations, and private tourism and hunting companies. In 1970 Tarangire National Park was created and local pastoralists were evicted and thus lost access to important

permanent sources of water in the park (Igoe 2004). Subsequent efforts to expand coverage of protected areas have entrenched tensions between state protected area managers and local communities over land and resource rights and access (Sachedina 2008).

Although Tanzania adopted a wildlife policy in 1998 that advocated increasing the flow of economic benefits to local communities, 10 years later implementation has been limited and wildlife remains under central control (Nelson 2007). Most importantly, the lucrative tourist hunting industry, which is based largely on concessions situated on community lands (as in Simanjiro District), remains under central control and generates limited benefits at the village level (Sachedina 2008). The result is that wildlife management in Simanjiro, and in much of northern Tanzania, suffers from a market failure whereby wildlife is economically valuable through commercial activities at the national level, but local communities lack rights to manage and benefit from wildlife. Villagers thereby lack sufficient incentives to support conservation and their actions and choices lead to wildlife declines, which is economically rational at the local scale but deleterious at the macroeconomic scale. Hence, the market as it is currently structured has failed to generate incentives for sustainable production of wildlife as a valued ecosystem service on community lands.

Despite these institutional constraints to wildlife conservation outside protected areas, several private tourism companies have developed a working model for community-based conservation through private-community tourism concession agreements. Starting around 1990, several tour operators initiated tourism joint ventures with two villages situated adjacent to Tarangire National Park. These contractual agreements provide for annual lease payments and per-client daily payments from the operators to the villages, in exchange for villages' allocation of a concession area where cultivation and tree felling for charcoal production are prohibited. By the late 1990s, this model for community-based conservation outside of state protected areas was spreading, with a series of other concession areas becoming established outside of Tarangire National Park's eastern boundary. By this time about 40,000 ha had been set aside as tourism concessions in several villages, which conserved wildlife habitat in a large stretch of village land outside the park. Local benefits also increased. Emboreet village earned over US$40,000 from two tourism concession agreements in 2005 alone (Sachedina 2008). Nevertheless, due to conflicts between community-based tourism ventures and centrally managed trophy hunting concessions, from 1999 onward central regulatory and administrative actions have consistently sought to restrict these ventures by either attempting to prohibit them outright or by attempting to divert payments from the village level to higher levels of government.

Design and Implementation of the Simanjiro PES Agreement

With agricultural expansion increasing on the Simanjiro plains, communities lacking sufficient incentives to protect wildlife from illegal use, and most wildlife-based revenues remaining under central control, alternative strategies are needed to generate local incentives to conserve wildlife and key habitats in the area. Expanding tourism concessions into the Simanjiro plains dispersal areas would seem like a logical measure, except that the plains become difficult to access by vehicle during the wet season (when the presence of an abundance of large mammals makes the area most desirable for tourists) due to the area's poorly drained soils. In addition, these tourism activities are already the subject of conflicts with hunting concessions in adjacent areas.

The need for an alternative mechanism for creating local economic incentives to conserve wildlife on community lands has provided the impetus for a novel PES experiment in Terrat village, one of the three main villages that encompass the Simanjiro plains. Terrat is a community of about 3500 residents and a land area of roughly 40,000 ha, which includes the eastern portion of the Simanjiro plains (Fig. 1).

The Simanjiro PES initiative arose from discussions among several nongovernmental organizations, both local and international, and tour operators with long-term involvement in the area. The basic initial concept was to develop a conservation concession or land easement contract with Terrat village as a pilot initiative that over time could be scaled up to cover other areas with key wildlife habitats. This agreement would be based, in terms of its contractual provisions and structure, on existing private-community tourism agreements in neighboring Emboreet and Lolkisale villages.

In 2004 and 2005 a group of five tourism operators with long-standing business and personal interests in Tarangire National Park and the larger Maasai Steppe ecosystem organized themselves into a consortium that agreed to act as the contracting party. These tourism companies agreed to share the recurrent annual costs of the agreement with Terrat, justifying this expense as a collective investment in the conservation of an ecosystem their businesses in the national park ultimately depend on.

This consortium of tourism operators negotiated with the village for designation of Terrat village's portion of the plains as the concession or "easement" area. This 9300-ha area had been used traditionally as dry-season grazing for livestock and was managed communally under jurisdiction of the village council. The agreement provides for an annual payment by the operators of approximately US$4500 in exchange for the village agreeing to formally exclude agricultural cultivation or

permanent settlements from the concession area. Traditionally, seasonal livestock grazing was explicitly allowed to continue because all parties agreed that such uses did not conflict with wildlife conservation objectives and comprised the key economic value of the area to the community. The contract also formally provides for the community's commitment to prevent activities such as charcoal burning and unlicensed hunting in the concession area. In exchange for the community assuming these enforcement responsibilities, the Wildlife Conservation Society agreed to provide salaries and equipment for four village scouts, requiring approximately US$300 in additional expenditures per month. These scouts also carry out wildlife monitoring activities using a modified version of the community-based event-book system developed for Namibia's communal conservancies (Stuart-Hill et al. 2005), which provides all parties and stakeholders with data on local wildlife trends over time.

The Terrat easement has been formally in place for about 4 years. It provides a simple formal mechanism for the village to maintain critical habitat on the Simanjiro plains and financial incentives that help prevent illegal use of wildlife in the area. Although the plains were already maintained by the community through traditional land-use rules, the PES contract reinforces and formalizes these so as to provide a greater likelihood the community will not in the future decide to allocate portions of the plains for farming. Recently, a court case was instituted against one farmer from a neighboring village who attempted to farm on the plains. The village used 1 year's annual payment from the easement to finance the successful prosecution of this case. Community revenues from the agreement have also been invested in collective social services, such as construction of a new primary school. The village has formed a management board that is responsible for overseeing the arrangement, including receiving and responding to reports from the game scouts, and for preparing plans for revenue expenditures in consultation with the village assembly. The revenues received through the agreement represent the first time Terrat has received direct and conditional economic benefits from the wildlife populations that use the community's lands.

The aim has been to develop financial mechanisms that create sufficient incentives for local communities to protect all of the Simanjiro plains in Sukuro, Emboreet, and Terrat villages. After about 3 years of successful administration of the agreement in Terrat, Sukuro village also began to express interest in joining the scheme, which would mean expanding coverage to include nearly 75% of the plains. This agreement is close to completion and indicates the potential for scaling up this PES framework to cover all the key habitat area over time. Although the PES approach is limited in its coverage in the region at present and data are not yet available to demonstrate positive impacts on local wildlife populations, the experience has been positive and presents an opportunity for further learning and experimentation.

PES as a Framework for Community-Based Conservation

Several contextual factors played a central role in enabling establishment of this PES arrangement and highlight considerations that may be important in the design of PES initiatives elsewhere: the local framework for village governance and land tenure, opportunity costs, and existence of village-tourism operator concession contracts in other villages. Tanzania's system of village governance and land tenure is unlike many other countries in sub-Saharan Africa. In Tanzania local communities have a clear statutory and corporate form. Thus, village councils, their accountability to the village assembly, and the formal rights of villages over defined land areas all contributed to the establishment of a PES scheme that is based principally on land-use criteria.

Wunder (2007) notes that PES schemes are most likely to succeed where landholders face limited opportunity costs in adopting the desired conservation practices or land uses, such that the PES scheme's investments provide additional conservation benefits yet remain relatively affordable in financial terms. In Terrat the easement agreement was feasible because the area was already traditionally managed for dry-season livestock grazing, a land use generally compatible with wildlife populations. In addition, the community was already concerned with growing external and internal pressure to expand village land allocations for farming, as cultivation expanded in surrounding areas. Pastoralist communities face their own internal trade-offs with respect to maintaining land as livestock pasture or allowing land to be converted to agriculture. For Terrat, agreeing to a formal contractual prohibition on agriculture on the short-grass plains bore few immediate costs and served to safeguard the community's existing system of land-use management.

Other villages near Terrat, in particular Emboreet, had long-standing concession contracts with tourism operators. The community's familiarity with these tourism ventures made the easement proposal easily understandable in a legal and contractual sense and helped allay possible community fears about external agendas for wildlife conservation. This preexisting model for village concession areas greatly reduced transaction costs of the deal, which are often one of the main constraints facing PES initiatives (Engel et al. 2008).

Beyond the immediate impact on habitat conservation and wildlife protection on the Simanjiro plains, a significant impact of this PES initiative has been establishment of a new type of framework for local community support of conservation in a site characterized by

historic and entrenched conflicts between local livelihood interests and conservation objectives (Igoe 2004; Sachedina 2008). Moreover, this framework is potentially a relatively cost-effective one. Cost of the annual village payment plus the village scout salaries is about US$8000, which for the easement area of 9300 ha comes to about US$0.86·ha^{-1}·year^{-1}. For comparison, the only analogous PES scheme in East Africa concerning wildlife conservation in savannah ecosystems is a land-leasing arrangement in a dispersal area adjacent to Kenya's Nairobi National Park. This scheme pays private landholders US$10/ha annually, and by 2006 was covering 3200 ha out of a total dispersal area of over 200,000 ha (Sikand 2007).

Within the Simanjiro area, the Tanzania National Parks (TANAPA) spent US$152,353 during the 6-year period 2000–2005, including an average of US$6540/year in Emboreet village on community projects designed to generate local support for conservation. These investments, however, did not result in any land being specifically protected for wildlife because these revenues were given to communities as an unconditional form of park-revenue sharing (Sachedina & Nelson 2009).

Also within the Maasai Steppe ecosystem, the African Wildlife Foundation has invested heavily in protecting the Manyara Ranch, which lies between Tarangire and Lake Manyara National Parks in a key migration corridor and is attempting to implement a community-based strategy for management of this property. Over 6 years, US$2.5 million was invested in the ranch's management (US$24/ha annually) (Sachedina 2008). None of these comparisons provide definitive evidence of the Terrat PES being the most cost-effective option for conserving migratory wildlife habitat on community lands, but the evidence available suggests the arrangement is more affordable and more effective in terms of protecting land from agricultural encroachment than some other ongoing conservation investments in the region.

The experience in Simanjiro, although preliminary, suggests PES schemes are a pragmatic option for community-based conservation of migratory wildlife populations in savannah ecosystems. Such alternatives are needed because wildlife management practices in sub-Saharan Africa often face considerable political and economic barriers to reform (Nelson & Agrawal 2008), which perpetuate market failures and the loss of valuable wildlife populations (Norton-Griffiths 2007). Payments for ecosystem services initiatives provide a potential mechanism for mitigating the consequences of entrenched policy and market failures and associated biodiversity losses (Engel et al. 2008).

As a possible framework for community-based conservation, PES schemes represent a potential tool for creating local incentives for conservation outside state protected areas. Much of the discourse on PES strategies contrasts them with more conventional community-based conservation approaches, in some instances arguing that PES are more effective and efficient (e.g., Ferraro & Kiss 2002). For example, Hutton et al. (2005) describe direct-payment initiatives as one of several new approaches that are undermining support for community-based conservation strategies: "another idea that has helped erode support for community-based activities is that of 'direct payments' for environmental services, including biodiversity conservation."

Contrary to such assessments, our experience suggests that PES schemes are functionally similar and operationally complementary to more established, familiar models for community-based conservation. In Simanjiro the PES scheme complements the preexisting community-based ecotourism ventures by adding to the overall amount of land set-aside by communities for conservation. The contractual structures for the two different models are nearly identical, and similar local governance arrangements apply in both cases. The main difference is that the PES scheme does not rely on an established commercial market for goods and services—such as is the case with tourism ventures or hunting concessions—but has had to develop an alternative financing arrangement for ecosystem services that are valued but not directly consumed in the marketplace at the point of production. Importantly, both commercial community-based tourism ventures and PES schemes depend on the ability of local communities to secure rights over land and to strengthen their institutional and organizational capacity for managing resources so that communities can effectively deliver the conservation service they wish to sell.

Conclusion

Payments for ecosystem services arrangements are a potentially important mechanism for conserving wildlife populations in savannah ecosystems where mosaics of public and private lands provide critical habitat and resources. Initial experiences in northern Tanzania suggest PES approaches may be relatively cost-effective and serve as a way to develop negotiated conservation frameworks that are acceptable to local communities that have historic concerns about external conservation interests. Key factors that enabled establishment of this PES scheme include an enabling institutional framework with respect to village governance institutions and land tenure, low opportunity costs as a result of the compatibility of local pastoralists' livestock management practices with the maintenance of wildlife habitat, and low transaction costs as a result of prior experiences with establishing private-community tourism ventures in the area. Although these factors illustrate the importance of social, institutional, and ecological context in the design and establishment of PES schemes, as with other related community-based

conservation approaches, similar initiatives may be feasible in other savannah ecosystems where wildlife populations rely on habitats outside state protected areas, but where local economic incentives for conservation are currently absent or insufficient. The paucity of other documented efforts to design PES schemes that aim to conserve wildlife on community or private lands in sub Saharan Africa suggests these approaches would benefit from broader use as a framework for community-based conservation.

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