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Enhancing Conservation, Ecosystem Services, and Local Livelihoods through a Wildlife Premium Mechanism

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Abstract: *We propose the wildlife premium mechanism as an innovation to conserve endangered large vertebrates. The performance-based payment scheme would allow stakeholders in lower-income countries to generate revenue by recovering and maintaining threatened fauna that can also serve as umbrella species (i.e., species whose protection benefits other species with which they co-occur). There are 3 possible options for applying the premium: option 1, embed premiums in a carbon payment; option 2, link premiums to a related carbon payment, but as independent and legally separate transactions; option 3, link premiums to noncarbon payments for conserving ecosystem services (PES). Each option presents advantages, such as incentive payments to improve livelihoods of rural poor who reside in or near areas harboring umbrella species, and challenges, such as the establishment of a subnational carbon credit scheme. In Kenya, Peru, and Nepal pilot premium projects are now underway or being finalized that largely follow option 1. The Kasigau (Kenya) project is the first voluntary carbon credit project to win approval from the 2 leading groups sanctioning such protocols and has already sold carbon credits totaling over $1.2 million since June 2011. A portion of the earnings is divided among community landowners and projects that support community members and has added over 350 jobs to the local economy. All 3 projects involve extensive community management because they occur on lands where locals hold the title or have a long-term lease from the government. The monitoring, reporting, and verification required to make premium payments credible to investors include transparent methods for collecting data on key indices by trained community members and verification of their reporting by a biologist. A wildlife premium readiness fund would enable expansion of pilot programs needed to test options beyond those presented here.*

Keywords: community based conservation, landscape conservation, large mammals, PES, REDD – Reduction of Emissions for Deforestation and Degradation, species conservation, sustainable financing for conservation, wildlife premium mechanism

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Mejora de la Conservación, Servicios del Ecosistema y Calidad de Vida Local Mediante un Mecanismo de Compensación de Vida Silvestre

Resumen: *Proponemos un mecanismo de compensación de vida silvestre como una innovación para la conservación de vertebrados en peligro. El esquema de pagos basados en resultados permitiría que actores en países con bajo ingreso generen ganancias mediante la recuperación y mantenimiento de fauna amenazada que también puede servir como especies paraguas (i.e., especies cuya protección protege a otras). Hay tres mecanismos posibles para aplicar la compensación: opción 1, incluir las compensaciones en un pago por carbono; opción 2, asociar las compensaciones con un pago por carbono, pero como transacciones independientes y separadas legalmente; opción 3, asociar las compensaciones con pagos por la conservación de servicios del ecosistema (PSE) no relacionados con carbono. Cada opción tiene ventajas, como los incentivos para mejorar la calidad de vida de habitantes rurales que viven en o cerca de áreas con especies paragua, y retos, como el establecimiento de un esquema subnacional de crédito de carbono. El proyecto Kasigau (Kenia) es el primer proyecto de crédito de carbón voluntario que obtiene la aprobación de los dos grupos que aprueban tales protocolos y ha vendido créditos de carbón por más de $1.2 millones desde 2011. Una porción de las ganancias se divide entre propietarios y proyectos que apoyan a miembros de la comunidad y ha añadido más de 350 empleos a la economía local. Los tres proyectos implican manejo comunitario extensivo porque se llevan a cabo en tierras propiedad de habitantes locales o que están arrendados a largo plazo por el gobierno. El monitoreo, registro y verificación requeridos para que el pago de las compensaciones tenga credibilidad para los inversionistas incluye métodos transparentes para la recolección de datos de índices clave por miembros de la comunidad capacitados para ello y la verificación del reporte por un biólogo. Un fondo disponible para compensaciones de vida silvestre permitiría la expansión de programas piloto que se requieren para probar opciones distintas a las presentadas aquí.*

Palabras Clave: Conservación de especies, conservación basada en comunidades, conservación del paisaje, financiación sostenible para la conservación, Reducción de Emisiones por Deforestación y Degradación, mamíferos mayores, mecanismo de primas para la fauna, Pago por Servicios Ambientales

Introduction

Many of Earth's most charismatic, wide-ranging large vertebrates are threatened by conversion and degradation of tropical forests and overharvesting of wildlife products (Macdonald et al. 2012). Failure of traditional conservation and appeals to deliver the financing, local cooperation, and political will necessary to prevent these losses gives urgency to innovative conservation strategies to protect these species over large landscapes to ensure their long-term viability.

The international mechanism Reducing Emissions from Deforestation and Forest Degradation (REDD+) is designed to halt or sharply reduce tropical deforestation. If enacted, REDD+ has the potential to bolster efforts to conserve the habitats of endangered species, particularly outside protected areas (Harvey et al. 2009; Venter et al. 2009). The capacity for REDD+ to shift land-use dynamics in forest zones in lower and middle-income countries depends on a system of performance-based incentive payments. To date, U.S.$4.5 billion is committed to REDD+ as part of fast-start financing (J. Niles, personal communication), and $100 billion annually by 2020 has been pledged to the green climate fund, which is expected to partially finance REDD+ (Venter & Koh 2012).

The initiative REDD+ is primarily carbon focused and forest focused, and some critics find its safeguards for species conservation (essentially the + in +REDD), as outlined in the text of the latest UN Framework Convention on Climate Change (UNFCCC), lack sufficient rigor to ensure wildlife conservation is explicit for those seeking REDD+ payments (Venter & Koh 2012). Without such clarity, REDD+ could overlook wildlife, especially those threatened by poaching or invasive non-native species (Collins et al. 2011). Similarly, schemes that generate payments for conserving ecosystem services (PES) are being developed (Daily & Matson 2008), but they do not reward protection of endangered species within PES-targeted areas.

To help mitigate these threats to populations of endangered species, we propose a wildlife premium mechanism (WPM), with explicit performance-based payments to meet conservation targets for these species, be nested within REDD+ and other PES schemes. There is strong justification for this linkage from an ecological perspective. Elimination of large vertebrates may adversely affect ecosystem dynamics (Estes et al. 2011) and ultimately reduce carbon sequestration and other ecosystem services. Conversely, wildlife conservation efforts can enhance carbon conservation. A World Wildlife Fund (WWF) analysis (unpublished, based on Ruesch & Gibbs 2008) shows that carbon densities in forested Tiger Conservation Landscapes (Dinerstein et al. 2007) are 3.5 times greater than in forests where tigers (*Panthera tigris*) have been extirpated, possibly because the presence of tigers was a motivation to protect forests from illegal timber harvesting. From a programmatic viewpoint, both direct payment schemes (Ferraro & Kiss 2002) and PES mechanisms

(Tallis et al. 2009) complement traditional conservation activities such as establishing protected areas. Although the evidence base that can be used to evaluate the relative effectiveness of these newer, market-based interventions is still meager (Pattanayak et al. 2010), and REDD+ is largely unimplemented, we suggest that the time is ripe to consider these innovative mechanisms in the context of conservation of large wildlife species.

Protected areas are essential to ensure viability of source populations of endangered large vertebrates, but for many species the forests in corridors and buffer zones of conservation landscapes are critical for maintaining connectivity among populations. In some countries, decisions about management and use of forests outside protected areas are increasingly devolving to local communities (Dinerstein et al. 1999; Sommerville et al. 2010). The challenge is to offset the opportunity costs imposed by the presence of large vertebrates so that local residents in and around these forests will view them as a net economic asset. Experiences from Nepal and Namibia indicate communities that reap economic benefits through tourism featuring large mammals become more tolerant of their presence (Dinerstein et al. 1999; NACSO 2008). The WPM is, thus, based on the hypothesis that economic incentives can encourage local stewardship for effective conservation of wildlife outside protected areas. The WPM would be contingent on the recovery and continued presence of selected threatened species in the forests under local stewardship. This contingency contrasts with integrated conservation and development projects (ICDPs) in which payments typically are not conditional on whether the goals are met. The rationale behind the WPM is that investors and donors will contribute a premium, over and above standard payments for REDD+ and other PES, to explicitly protect charismatic, highly threatened species that is performance based (Ferraro & Pattanayak 2006). Because these are often umbrella species, defined by Lambeck (1996) as species whose protection benefits other species with which they co-occur, such protection is a likely ecological benefit of WPM.

Here we address issues central to the creation of the WPM. We discuss the theory and evidence supporting the viability of charging a premium for conserving charismatic species. We propose 3 options for structuring the WPM and the advantages and challenges of each, beyond those associated with PES schemes in general (Tallis et al. 2009). We describe 3 pilot projects that illustrate how WPM projects are being planned or implemented in different social and ecological milieus.

Theory and Evidence Behind Premium Payments

Economists classify values associated with nature in several ways. One classification considers both use values (in which nature is used either directly, such as in hunting, fishing, or ecotourism, or indirectly, such as in flood control or waste assimilation) and nonuse values (Edwards & Abivardi 1998). Of particular interest here is existence value, which refers to a nonuse value in which a person derives benefit from the existence of some good independent of whether it will be used. Researchers have estimated existence values for the large, charismatic vertebrates that are potential WPM targets (Kellert & Wilson 1993) (Table 1). The practical counterpart to these demonstrations of existence value is conservation organizations' use of flagship species to market their work and solicit donations. Strong evidence of existence value (i.e., willingness to pay for something without the intention of ever directly or indirectly using it) also comes from the Global Tiger Recovery Program, which was endorsed by countries within the tiger's geographic range in late 2010 at the Global Tiger Summit. Eighteen months later, more than $210 million had been allocated by multilateral agencies, such as the World Bank, bilateral aid agencies, nongovernmental organizations (NGOs), charitable foundations, and private individuals toward an estimated $350 million of incremental funds necessary for the first 5 years of a 12-year effort to double tiger numbers globally (A. Zakharenka, personal communication). Because tigers are umbrella species, this unprecedented conservation effort will benefit many other species.

The WPM concept requires investors be willing to pay a premium on credits for carbon sequestration or other ecosystem services that come bundled with demonstrable wildlife benefits and that is large enough to offset opportunity costs of conservation borne by local land stewards. These investors may be individuals, corporations, foundations, and nonprofit organizations or governments. Evidence of willingness to pay premiums for environmentally friendly versions of various consumer products (e.g., tuna, timber, coffee) exists, although debate continues on the on-the-ground effectiveness of these certification schemes (Blackman & Rivera 2011). Anecdotal evidence suggests carbon investors in the voluntary market may be willing to pay a price premium if carbon credits are bundled with cobenefits such as species conservation or improvements in local livelihoods (MacKerron et al. 2009; Parnphumeesup & Kerr 2011). Naturally, the size of the price premium associated with any particular species in any particular market will vary and this should be investigated via studies of willingness-to-pay levels of potential WPM investors.

Implementation Options and Challenges

The WPM concept is designed to be linked to emerging markets for forest carbon or ecosystem services. We present the WPM with 3 distinct options for payments (Table 2). In a fourth option, not discussed further, WPM investments are stand-alone schemes, similar to

Table 1. Estimated willingness-to-pay values for an illustrative selection of potential flagship species in different geographic regions suggest that a market in wildlife conservation is possible.

Species	*Goals*	*Country of species*	*Nationality of respondents*	*Elicitation type*	*Value (U.S.$)*[a]	*Source*
Asian elephant (*Elephas maximus*)	maintain current population size	Sri Lanka	Sri Lanka	contingent valuation	1/month	Bandara & Tisdell 2005
Mountain gorilla (*Gorilla beringei beringei*)	maintain current population size	Uganda and Rwanda	United States, Europe, & Australasia	contingent valuation	187 million[b]	Hatfield 2004
Gray wolf (*Canis lupus*)	reintroduction	United States	United States	contingent valuation	22–162	Richardson & Loomis 2009
Black bear (*Ursus americanus*)	maintain current population size	South Korea	South Korea	contingent valuation	4.99	Han & Lee 2008
Korean mountain goral (*Naemorhedus caudatus*)	20-fold increase in population size	South Korea	South Korea	choice experiment	18.06	Han et al. 2010
Javan rhinoceros[c] (*Rhinoceros sondaicus*)	habitat protection and reduction of poaching	Vietnam	Vietnam	contingent valuation	13–14/month	Thuy 2008
Giant panda (*Ailuropoda melanoleuca*)	maintain population in natural habitat	China	OECD[d] countries	contingent valuation	14.86	Kontoleon & Swanson 2003

[a] *Per-household unless otherwise indicated.*
[b] *Total value extrapolated across surveyed countries.*
[c] *The Javan rhinoceros has since been declared extinct in Vietnam.*
[d] *Organization for Economic Cooperation and Development.*

development assistance or philanthropic donations, except that performance is based on response of a charismatic species and the commitment is long term.

Option 1 embeds the WPM in a carbon payment. Investors pay higher prices for carbon credits from projects that also meet conservation goals for selected wildlife. Thus, WPM sits within the compliance-based REDD+ accounting system, and WPM credits are integrated into a national or subnational framework and have a submechanism that allows WPM credits to be withheld pending compliance. A conceptual framework of how option 1 might be implemented is presented as a case study of the Terai Arc Landscape (TAL) (Fig. 1). Until compliance carbon trading becomes operational, the WPM could be experimentally embedded in voluntary carbon-market transactions as a premium for conserving target species within a project area. This concept is similar to other schemes that bundle various ecosystem services or community-development values into carbon credits (Ebeling & Yasue 2008), but payment of premiums would be performance based. Projects that meet carbon-emission goals but fail to achieve wildlife-recovery targets would have the wildlife-premium component of payments held in escrow until the target is reached.

Option 2 links the WPM payment to a related carbon payment, but the 2 transactions would be independent and legally separate, and the WPM would be a cobenefit. This model reduces the risk that the wildlife aspect of the project would fail in situations where communities deliver on WPM objectives but fail to deliver on emission reductions.

Option 3 links the WPM to noncarbon PES. The WPM payment can be linked to either the PES, similar to option 1, or be delivered separately, as in option 2. For example, when an energy company enters into a PES or offset scheme covenant to pay for watershed protection (e.g., Nam Theun 2 Dam in Lao PDR [Wang et al. 2010]), the agreement could also include WPM funds to communities if explicit wildlife conservation goals are met. The WPM could also be met through the company's social-responsibility arm or even another donor.

Kasigau Corridor Project, Kenya

The Kasigau Corridor REDD project in southeastern Kenya is designed to bring direct financing for carbon emissions reduction to communities while securing the wildlife migration corridor (about 200,000 ha of forest) between Tsavo East and Tsavo West National Parks through which over 500 African elephants (*Loxodonta africana*) migrate seasonally. Without active protection, this connectivity would likely be broken by subsistence agriculturalists. Additional project goals are to enhance carbon stocks, create alternative livelihoods for people in the surrounding areas to remove pressure on the forest, and maintain the high conservation values of the project area. Since 2010, income from the sale of carbon credits has been managed by a private company, Wildlife Works Carbon (WWC), which uses the funds to provide direct carbon payments to local landowners and support local projects it designs and operates. These funds have

Table 2. Advantages and challenges of 3 organizational options proposed for the Wildlife Premium Mechanism (WPM).

Option	*Advantages*	*Challenges*
1 Wildlife premium embedded in an enhanced carbon payment	Single investor and management structure; fewer administrative and management links than option 2. Economies of scale reduce transaction costs compared with separate carbon- and wildlife-linked projects. Can be promoted as a better investment for carbon buyers to make a beyond Corporate Social Responsibility (CSR) contribution to climate stability. Can appeal to leading companies investing in the carbon market that want to benefit from projects with high visibility wildlife conservation value. Could mean stronger and longer-term commitment from investors, given that the carbon payments likely will have a lifespan of at least 20–30 years.	Carbon-linked WPMs that involve voluntary carbon market finance must compete in a market in which, currently, the supply of carbon exceeds demand for purchase of credits. Investors must have interests beyond strict commercial value of carbon. Some confusion may arise about the differences between WPM and existing co-benefit standards such as Climate, Community and Biodiversity Standards. Carbon-linked WPM that involve voluntary carbon market finance suffer from problems generic to voluntary carbon projects such as leakage and poor or weak verification protocols, although progress is being made to address these concerns. Substantial questions also remain about how such voluntary carbon market credits will be treated under future compliance market or national REDD+ programs. Premium payment may be less than if wildlife credits were sold independently. Uncertainty about the size of the wildlife premium investors will be willing to pay on top of the stand-alone carbon payments. Financial structuring of carbon projects becomes more complex. May be difficult to integrate a wildlife-related performance payment system within carbon-based payment model. Adds to complexity of developing, completing, and compliance with terms of carbon credit exchange.
2 Wildlife premium payment stream developed independently with plans to link to a national-level REDD+ program	Addresses concerns of wildlife agencies in REDD+ countries that carbon payment schemes will be slow to emerge; a wildlife premium mechanism might be launched more quickly, but that is an untested assumption. Can attract separate investors with potential to obtain higher premium payments than if wildlife credits were integrated into carbon payment. Could be linked to environmentally certified products or commodities. Eventually, assuming carbon market develops in a country, this option may attract investors interested in conservation of charismatic species by allowing them to leverage their investment by joining with a carbon investment. Greater combined income from separate carbon and WPM payments may offset lost opportunity costs that otherwise would be too high to allow either contract independently. Greater return-on-investment for donors because payment structure is performance-based (applies to next option as well).	Need to create a premium mechanism and then search for additional investors. More administrative and management hurdles initially, and links throughout agreement, may result in higher management costs. Limited to locations where there is potential for a carbon transaction. Client could decide in the future to end WPM agreement but continue with carbon contract.
3 Wildlife premium payments linked to payment for ecosystem services (PES) schemes, either embedded or in addition to ES payments	Could be quickly coupled with existing PES schemes to test the WPM concept. Could apply in places where carbon investments are improbable, such as nonforest or mixed land-cover types. As with option 2, could also be linked to environmentally certified products or commodities. Can attract same or separate investors in the wildlife project and the carbon project, giving flexibility. Can attract investors interested in charismatic species conservation by allowing them to effectively leverage their investment by joining a PES scheme. Some potential in the future for national or local requirements for PES schemes in conjunction with large infrastructure projects.	Must have PES scheme in place or guaranteed first; currently such systems are not commonplace. If embedded in the ES payment and in the absence of a market price for the associated ES, companies may pay less for the ES portion so total payout remains the same. If on top of ES payment, client could end WPM agreement while continuing PES. The separate investor option would incur higher administrative and overhead costs than the single investor option. Uncertainty about how much WPM component can be priced above stand-alone ES payments.

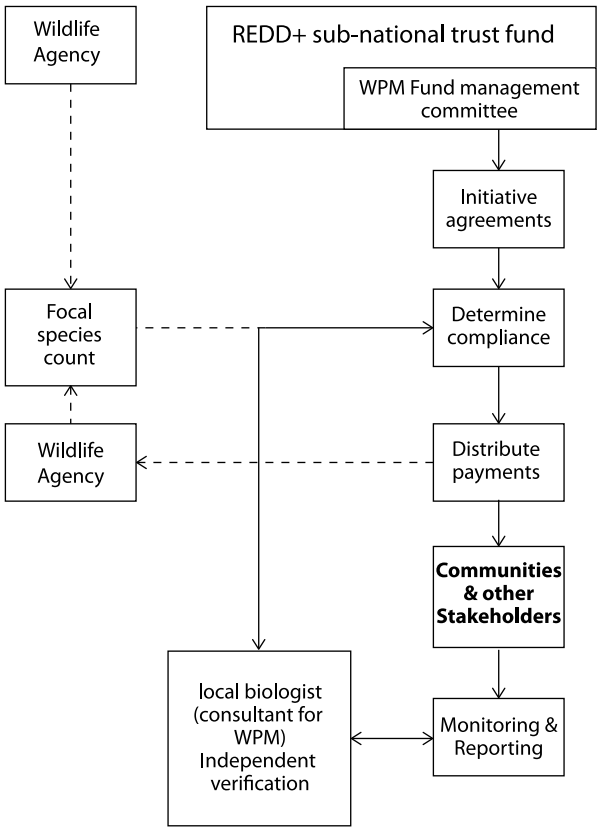

Figure 1. A preliminary conceptual framework for the wildlife premium mechanism (WPM). The monitoring, reporting, and verification system triggers payments.

been used to subsidize a clothing factory employing local women, construct and operate several community-based plant nurseries, construct schools, and maintain a cadre of unarmed wildlife rangers to patrol the project area. The mechanisms in place for REDD revenue sharing and the protocol for distributing payment for environmental performance provide the foundation on which to expand the WPM component as proposed in option 2.

The Kasigau project was the first carbon project with a WPM element to earn validation from the most widely accepted standard protocols. It has sold carbon credits totaling over $1.2 million since June 2011. A portion of the earnings is divided among community landowners and projects that support community members (Fig. 2). It has added over 350 jobs to the local economy. Additional funding has gone toward construction of 20 classrooms near the corridor area. Revenues from the project are supporting the position of a Kenyan PhD biologist to oversee the monitoring program for both social and ecological results.

Some of the staff hired by the carbon project are trained rangers who collect wildlife data and evidence of poaching and illegal harvesting of forest products during patrols. These data will form the basis for the monitoring reporting and verification necessary for performance-based payments to be disbursed. Reduced poaching may be a useful performance metric where species are commercially hunted (Sommerville et al. 2011). The current REDD+ revenue-sharing plan for carbon credit rewards has led to reduced poaching of elephants and could be applied to higher-level WPM rewards for additional monitoring activities to track abundances or reduced poaching of other target species. The cost of active antipoaching efforts (e.g., rangers, patrol vehicles) is estimated at $500,000/year for 200,000 ha (i.e., $2.50/ha/year).

Madre de Dios Corridor, Peru

The Madre de Dios corridor is critical for maintaining connectivity of a 5-million ha network of protected areas connecting lowland Amazonia with the eastern slope of the Andes. The region supports one of the world's most diverse terrestrial ecosystems (Foster 1990; Solari et al. 2006) in a landscape where the single major break in protection lies on either side of a highway linking the western states of Brazil with ports on Peru's Pacific coast. This 50- to 100-km wide corridor is mostly forested, and provides biological connectivity for large mammals such as jaguars (*Panthera onca*), tapirs (*Tapirus terrestris*), and white-lipped peccaries (*Tayassu pecari*), which are currently abundant across the region. However, long-term development scenarios for the Amazon Basin include agricultural conversion (Soares-Filho et al. 2006), which would sever connectivity and potentially threaten the viability of these species.

The government retains title to most of the land within the protection gap and has leased about 1.2 million ha in the form of 40-year leases to Castañeros (Brazil nut harvesters), who have agreed to protect the forest in exchange for exclusive rights to harvest the nuts from trees growing naturally within the forest. However, income from Brazil nuts is insufficient to sustain the Castañeros, who are under pressure to abandon their concessions or generate supplementary income by selling timber from their concessions as permitted by their contracts with the government. Thus, the WPM, in conjunction with a REDD+ carbon agreement, could augment the Castañeros' income sufficiently to be economically viable. Options 1 and 2 are being considered in the project design to provide a premium for Brazil nut harvests as the ecosystem service from the forests.

When the WPM is implemented in Madre de Dios, members of the Castañeros association will be trained to monitor and report compliance verification. Indicators of successful population recovery will be the presence of jaguars, pumas (*Puma concolor*), ocelots (*Leopardus pardalis*), Razor-billed Curassow (*Mitu tuberosum*), and Pale-winged Trumpeter (*Psophia leucoptera*). All are negatively affected by human activity. We expect use of

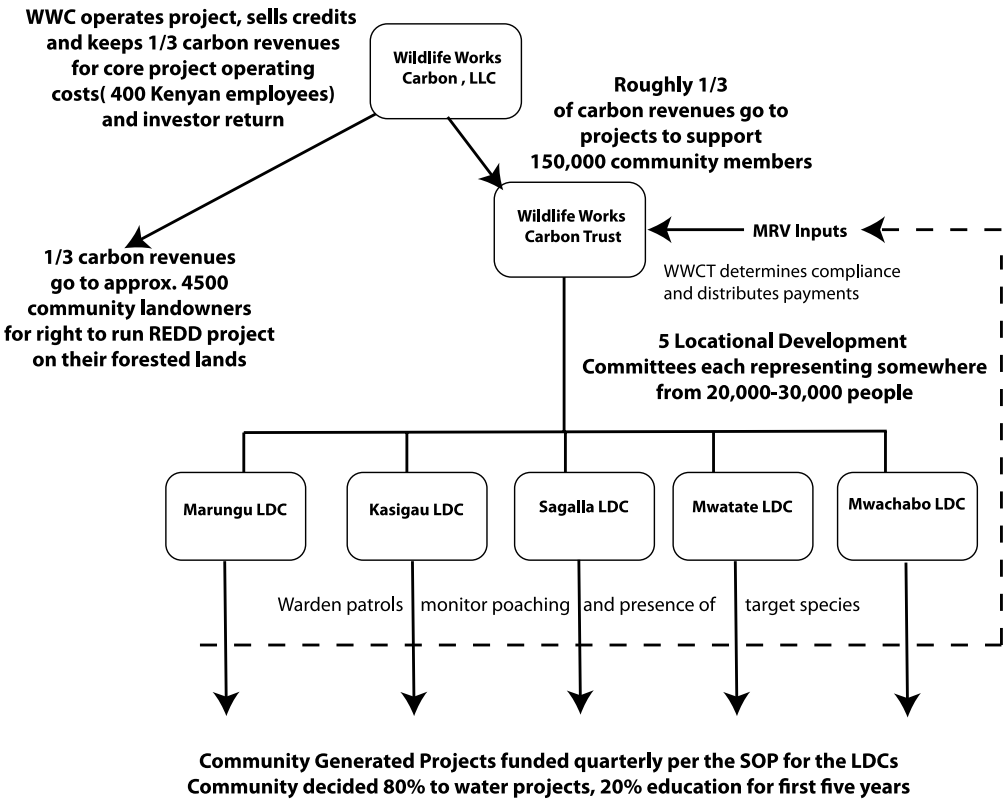

Figure 2. The benefit-sharing mechanism in the Kasigau Wildlife Premium Mechanism program divides a portion of the carbon revenues among community landowners and projects that support community members (MRV, monitoring, reporting, and verification; WWCT, Wildlife Works Carbon Trust; SOP, standard operating procedure; LDC, locational development committee).

a tiered payment scheme that is based on relative abundances of these species. Abundance data will be derived from an extensive database for which data are being collected. The initial payment could be disbursed for the simple presence of target species, whereas the full payment would be earned when minimum abundance levels for all 5 species are met. We estimate the cost of monitoring, reporting, and verification, including camera traps, data analyses, stipends for 10 compliance monitors, and the part-time salary of a biologist from a local nongovernmental organization, would be about $38,000/year, or about $0.19/ha/year for the 200,000-ha region of initial interest (G.P., personal observation).

Terai Arc Landscape, Nepal

The Terai Arc Landscape (TAL) is a system of protected areas and corridors that extends for about 1000 km along the Himalayan foothills of southwestern Nepal and northwestern India. It was created to recover and conserve the tiger and one-horned rhinoceros (*Rhinoceros unicornis*) and to sustain ecological services (Wikramanayake et al. 2010). Community engagement through community-forestry programs was the primary strategy to restore and maintain forest cover in park buffer zones and corridors in the Nepal portion of the landscape. Community-based antipoaching teams protect the tigers and rhinoceroses that occupy these multiple-use areas and did so even during a decade of civil strife when protection in the parks was abandoned and poaching soared. This successful and ongoing program has benefited local people directly through tourism revenues and marketing of timber and nontimber forest products (Wikramanayake et al. 2010). With funding from a U.S. Agency for International Development grant to WWF, a WPM is being designed to expand the community-based programs to include corridors that have been identified as critical to maintaining connectivity among tiger subpopulations. Option 1 (i.e., attach a higher price to carbon credits) is being considered as the vehicle for piloting wildlife premiums.

In the TAL pilot, community-based antipoaching teams are already in place and conduct regular forest patrols.

Presence of tigers and rhinoceroses in the corridors is being recorded in the TAL as part of government-led periodic censuses across the landscape. When tigers (the focal species) are detected by the community-based antipoaching teams, they report the evidence to the project biologist, who verifies the claim with camera traps or other suitable tools. The approximate cost of monitoring, reporting, and verification for tigers and prey by community-based groups, as estimated by WWF-Nepal in the 8000-ha Khata corridor, is about $1.30/ha/year.

Discussion

An important goal of the pilot projects testing the WPM concept is to increase the transparency of performance-based payment structures and monitoring of carbon and wildlife to attract funding from international investors and donors. Many ecological, economic, social, and political considerations must be addressed to increase transparency of monitoring when launching a portfolio of WPM projects. The pilots were designed following extensive consultation among relevant experts and stakeholders who considered several criteria to be imperative for successful implementation. These are similar to those that were important to the success of past interventions linking ICDPs with the recovery of large mammals as explicit targets (Dinerstein 2003). The forests and other habitats under consideration in the landscape must meet 3 criteria: contribute to the conservation of the target species by functioning as a corridor or staging area for movement among core areas, be large enough to provide sufficient additional habitat that allows a marginally viable population to become a source population, be critical seasonal habitat, or combinations of the above. Ideally the forests should also contribute to a climate-change-integrated conservation strategy (Hannah et al. 2002). Well-defined, stable land tenure will increase the probability of achieving conservation targets, as will a history of good governance and democratic practices among local communities (Dinerstein 2003).

Robust monitoring, reporting, and verification by independent verifiers who are sanctioned by the WPM would increase investor confidence in the WPM. Just as carbon payments support the cost of forest management and monitoring associated with REDD+ projects, the WPM payments must finance monitoring, reporting, and verification of species targeted as indicators of wildlife recovery. Thus, it is critical to keep the monitoring, reporting, and verification protocol simple so associated costs are substantially less than the performance-based payments negotiated in contracts. Initial estimates from the case studies indicate monitoring, reporting, and verification costs range from $0.19 to $2.50/ha/year. This suggests that relatively inexpensive and verifiable community-based monitoring should make performance-based programs economically viable (cf. Sommerville et al. 2011).

One of the several challenges in the WPM pilot projects was achieving acceptance from local communities for conservation activities. In Kasigau WWC incorporates input from communities into the design of their activities, but they control implementation. The project is under great pressure from local communities and from cattle grazers within and outside the local community due to area-wide droughts that are reportedly increasing in frequency and severity. How effectively this pilot project is able to counter these pressures will be a test of the utility of the concept. The model of change in resource management developed and refined during WWC's 14 years of constructive engagement with communities offers opportunities to experiment with the WPM and address unanswered questions about distribution and conservation effect of benefits that change behavior of recipients.

The success of WWC in securing funding from mainstream financial institutions and the relatively high demand for a voluntary carbon standard and credits validated by climate, community, and biodiversity outcomes from their projects suggest that a willingness to pay for conservation and livelihood outcomes can be cultivated in this nascent marketplace.

The main challenge for the Madre de Dios pilot project will be organizing the approximately 400 leaseholders, most of who must participate in the project because the major conservation value will be maintaining sufficient connectivity across the highway. However, many Castañeros are already organized into associations and are working with local nongovernmental organizations to surmount legal hurdles to tenure issues. The TAL WPM initiative will differ because it will be part of a subnational REDD+ program with full endorsement from the Nepal government.

To maintain the interests of both stewards and investors, we recommend contracts that trigger partial payments as early milestones are achieved. Monitoring, reporting, and verification are thus being designed to support a tiered system that earns incremental payments in a structure tailored to the biology of the target species. In the TAL, for example, proposed sequential milestones include rezoning of cattle grazing or signs of increased stall feeding (encouraged because cattle fed in enclosures do not compete for food with wild ungulates and are not at risk of being killed by tigers like free-ranging cattle are); recovery of grasslands and riverine forests inhabited by tiger prey; increases in abundance of tiger prey; and presence of tigers.

The WPM projects, including the pilot projects outlined here, will evolve and become more effective over time. In most tropical countries, carbon payment mechanisms and PES schemes are similarly evolving. Making the WPM a value-added component of these schemes

is timely for the coevolution of mechanisms to achieve effective conservation of species at landscape scales.

We also propose the creation of a WPM readiness fund to advance the design of pilot projects and test various implementation options. We are working with multilateral agencies, such as the World Bank, and conservation and private sector organizations to establish such a fund.

The WPM readiness fund could be modeled after the various REDD readiness funds administered by the World Bank's Forest Carbon Partnership Facility or the Forest Investment Program, particularly if the fund would be at a subnational level to align with an emerging focus on subnational carbon agreements (J. Niles personal communication). Such funds could help projects establish wildlife baselines (i.e., document distribution and abundance or occupancy of target species), establish monitoring, reporting, and verification protocols, conduct willingness-to-pay surveys among potential investors and willingness-to-steward surveys among local communities, and develop robust performance payment contracts. Other concerns could be addressed with appropriate design parameters to test, for example, whether a WPM leads to changes in the behavior of communities toward wildlife, how payments amounts can be estimated and transactions executed, and conditions under which different WPM organizational options might best function.

Traditional conservation programs have failed to reverse the rapid population decline and range collapse of many low-density, wide-ranging species. Wildlife premium readiness funds could accelerate implementation, testing, and refinement of this new conservation model and usher in a new era of results-driven, landscape-level conservation.

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