Bundling and Stacking for Maximizing Social, Ecological, and Economic Benefits: A Framing Paper for Discussion at the "Bundling and Stacking Workshop", April 5-6, 2012

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Introduction

Ecosystem services markets and programs offer the opportunity to drive investment in the natural infrastructure upon which we all rely. The focus of many markets, agreements, and transactions are a single ecosystem service, which in many ways could be counter to an ecosystem-based perspective to management. By optimizing for one ecological function or attribute, these singular approaches may fail to support the interconnectedness among ecosystem services across a land/sea-scape and could lead to ecological degradation if the over-emphasis on enhancing or managing one ecosystem service undermines the provision of other services (Salzman and Ruhl, 2000, Raudsepp-Hearne et al. 2010). Furthermore, in some contexts, the proliferation of multiple, yet fragmented single services programs may result in the restoration or conservation of several small sites that lack ecological integrity and are unlikely to provide sufficient ecological benefits for meeting society needs, which may be better met by larger more contiguous areas. In contrast, approaches that integrate multiple ecosystem services through ecosystem service markets and/or programs may provide the incentives necessary for natural resource managers to sustainably use, restore, or conserve land or sea-scapes to produce multiple ecosystem services at ecologically relevant scales (La Rocco and

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Deal, 2011). This is especially true in many countries, such as developing nations with tropical forests, where threats to ecosystems are extremely high and where multiple incentives may be necessary to compete with the many, different pressures on ecosystems. In addition, more holistic approaches may enhance the ecological resilience of land/sea-scapes and may decrease economic risks for land owners or natural resource managers by diversifying their income streams from ecosystem service markets.

Two primary approaches, "Bundling" and "Stacking" of ecosystem service credits, have emerged as mechanisms for fostering the integration of multiple ecological values into environmental markets or similar transactions, thereby, securing greater ecological benefits than would be possible from a single-program or market approach (LaRocco and Deal, 2011, Deal et al. 2012). In developing countries, such approaches may also help small-scale farmers or land-holders engaging in ecosystem service markets to increase their revenue, diversify their income streams, and/or buffer themselves against shocks associated with fluctuations in demand within any single market. Thus, if correctly implemented, bundling or stacking policies could simultaneously promote economic resilience for sellers and promote ecological resilience by creating financial incentives that promote more holistic approaches for protecting ecosystems rather than emphasizing conservation, restoration or management focused on only one ecological attribute. However, operationalizing these approaches is a complex task as much confusion remains around the concepts, particularly stacking, and how implementation should proceed (Fox et al. 2011, La Rocco and Deal, 2011). This paper will explore some of the risks and benefits of the two approaches and will identify key questions that need to be answered to support the successful use and adoption of these mechanisms. For the purposes of this paper, we will follow Cooley and Olander's (2011) precedent of focusing on these issues with respect to two categories of ecosystem service markets and payment programs: (1) offsets and mitigation credits and (2) conservation payments and incentives (also known as payments for ecosystem services (PES).

Bundling

Benefits

"Bundling" ecosystem services refers to combining more than one ecosystem service credit type from the same area of land (coastline or marine area) into a single credit type (Wunder

and Wertz-Kanounnikoff, 2009; La Rocco and Deal 2011; Deal et al. 2012). An example of this is the national Payments for Ecosystem Services scheme in Costa Rica, where the government distributes payments to land-owners for the bundle of biodiversity and carbon benefits generated from specific land-use practices on a specific area of land (Pagiola et al., 2004, Wunder and Wertz-Kanounnikoff, 2009). In this program, and similar other national programs like this, the state acts as a representative of several service users and makes integrated payments for several services generated from the same plot of land (Wunder and Wertz-Kanounnikoff, 2009). Often, no attempt is made to add up the individual values of each ecosystem services to determine the payment levels. For example, in the United States, wetland mitigation banking represents a bundled ecosystem service credit: a single payment is made for a wetland credit which includes the provisioning of multiple ecosystem services such as water quality regulation, habitat for biodiversity, carbon storage for climate regulation, and hydrological regulation, but the price of the credit is typically based on spatial units, such as acres of wetland or habitat, but not necessarily based on the value of each of the individual services. Such bundled credits have been developed to mitigate or offset multiple impacts on an ecosystems, such as the loss of a wetland or endangered species habitat. Other examples of bundling have also emerged in voluntary markets and commodity markets. For example, the selling of Ibis Friendly Rice (Clements et al. 2010), bundles the biodiversity value of a rare bird species, a cultural service, with sustainably produced rice, the primary ecosystem service of interest in the transaction. The Ibis Friendly brand generates a higher price in national markets than traditional rice, which consumers can purchase if they care about biodiversity. It is important to note that the Ibis values could not be transacted in this commodity market without being bundled with the rice. Thus, bundling may represent a way to increase support for ecosystem services that have important societal values, but that may not be sellable in traditional markets.

From a buyers', perspective, bundling can represent a means for meeting several ecosystem service goals through one mechanism. For example, a government with a mandate to provide several different services such as improvement/maintenance of carbon stocks, water quality

and/or biodiversity may employ bundled payments as a mechanism for securing multiple benefits through a single cost-effective, efficient mechanism. Another scenario could involve an extractive industry that may use a bundled payment to mitigate their impact to meet regulatory requirements for water quality, for example, as well as, to meet other objectives, such as protecting biodiversity for Corporate Social Responsibility reasons. Thus, a bundled credit can help meet multiple goals in a cost-effective way (Wunder and Wertz-Kanounnikoff, 2009). However, in other cases, where achieving multiple goals is not the objective of program, the bundling of services under a single credit type may require buyers to purchase additional services that they do not want (Chan et al. 2006; Kroeger and Casey, 2007).

From a sellers' perspective, bundling can be attractive in multiple ways. Combining multiple credits into a single credit offers the potential for reducing the high transaction costs of establishing individual markets for carbon, water, wetlands, and/or species conservation, for example (Deal et al. 2012). Similarly, bundling may also provide a more administratively efficient process for integrating different ecosystem services (water, wetlands and endangered species for example) that are managed by different regulatory agencies (Chan et al. 2006; LaRocco and Deal, 2011). Furthermore, bundling may allow compensation for a service that a land-owner is helping to produce, that has value to society, but could not be sold alone. For example, the biodiversity value added to voluntary carbon credits generated from avoided deforestation or reforestation as certified by the Climate Community and Biodiversity Alliance (CCBA) may not be sellable on other markets. Thus, forest managers can be compensated for their work to manage carbon stocks, as well as, biodiversity through on payment. However, the question arises as to whether the additional price the forest manager may receive for biodiversity rich carbon versus stand-alone carbon is sufficient to cover the costs of maintaining/enhancing both services, especially if they require slightly different/additional management practices. Another advantage of bundled services as a mechanism is that it can reduce the risk of double-counting or concerns of additionality associated with stacking of ecosystem services credits, as discussed below (Boyd and Banzhaf, 2007, Clements 2010). From an ecological perspective, if there are buyers for bundled services, bundling may also reduce

ecological trade-offs that may occur across ecosystem services if only one service was the focus of a project and management strategies ((Raudsepp-Hearne, Peterson, & Bennett, 2010).

Risks

Market rules will ultimately determine whether or not a bundled credit can be sold into a regulatory market (Deal et al. 2012) and the voluntary market for many services, such as carbon credits with biodiversity or Ibis Friendly Rice may be too limited to support a high number of suppliers. Furthermore, from a social perspective, bundling may limit the diversity of markets in which land-holders or resource managers engage, which could be risky if markets are volatile and incomes are highly dependent on a single revenue stream from bundled service payments (Clements et al. 2010), so sellers may prefer to sell multiple discrete services in different markets, to hedge their bets and insure against market fluctuations, particularly if revenue from environmental markets represent a significant, important income stream for their households.

Stacking

Stacking refers to receiving multiple ecosystem service payments for services generated on a single area of land, coast or sea and differs from bundling in that credits are sold separately into different markets (Cooley and Olander, 2011). Broadly, three main categories of stacking have been identified:

- Horizontal stacking occurs when more than one distinct management practice is implemented on non-spatially overlapping areas of a land/sea scape and the project developer receives a single payment for services generated/secured by each management practice. For example, a landowner could plant trees across a plot of land and receive nutrient credits for the trees planted as a buffer along a stream and carbon credits for trees planted in a different, upland part of the landscape.
- Vertical stacking occurs when a project participant receives multiple payments for a single management activity on spatially overlapping areas. For example, a landowner plants a forested riparian buffer to receive separate payments for both water quality credits and carbon credits from the same area.

- Temporal stacking is similar to vertical stacking in that the project involves only one management activity, but payments are disbursed over time. For example, a landowner restores habitat to receive endangered species credits. Later, when a carbon market develops, the landowner can receive carbon offset credits.

Of the three types of stacking described here, horizontal stacking is the least controversial, because each management activity is credited only once (Cooley and Olander, 2011). In a recent survey conducted by Fox et al. (2011) in the United States it was determined that the majority of respondents identified vertical stacking as the appropriate definition of "stacking", which is also the most challenging and controversial form of stacking from a regulatory perspective.

Benefits

Stacking payments, using the definition of vertical stacking, could have a number of positive outcomes. First, it could provide multiple incentives to conserve or enhance several ecosystem services across a landscape, which may foster better over-all management practices and improve over-all ecosystem functioning. Second, stacking could provide sufficient economic incentives to engage with ecosystem service management practices that may not be possible with one market opportunity. For example, a single market or payment program may not pay landowners enough to make individual projects cost-effective, but multiple programs providing multiple payment streams could cover a land-owner's or natural resource manager's opportunity costs. Third, stacking could encourage landowners to develop higher-quality projects that may not be cost-effective with one revenue stream (Cooley and Olander, 2011). For example, stacking may make it more appealing to plant slower growing, native trees that sequester carbon and also are good for biodiversity and water regulation rather than planting fast growing, exotic tree species that may sequester carbon rapidly, but may negatively affect the water table and may not be hospitable for native biodiversity. In the former hypothetical scenario, the land-use manager could be compensated through markets for carbon, water regulation services, and eco-tourism, which would not be possible in the latter scenario where only payments for carbon may be possible. Stacking of multiple services may also be the best

way to achieve social and ecological resilience. For example, if one market crashes, other revenue streams may still exist to incentivize project developers to continue sustainably managing the landscape sustainable during economically stressful or volatile periods (Clements et al. 2010). From a social perspective, stacking is similar to approaches used by micro-finance organizations that promote portfolio diversification, which encourages small-scale producers to engage with multiple markets, and, thus, to maximize economic resilience to shocks by having several different revenue streams upon which their livelihoods depend (Koontz 2011, personal communication).

Risks

Operationalizing stacking is a complex task because much confusion and debate remains around the concept and if/how implementation should proceed (Fox et al. 2011). In the United States, stacking is complicated by the number of agencies involved in environmental credit markets and the different currencies of credits between markets (acres, pounds/tons, and breeding pairs (Fox et al. 2011). Furthermore, many skeptics of stacking are concerned about the issues of double counting and additionality (Cooley and Olander, 2011, Fox et al. 2011). Double counting occurs when multiple services are ecologically interconnected to each other and, thus, are counted more than once. For example, selling wetland credits to one buyer for mitigation purposes and water quality credits to another buyer for nutrient trading purposes, could risk selling the same service twice. Additionality is a related concept and refers to a concern that payments do not result in additional actions or changes in natural resource management practices other than what would have occurred without a payment. This issue is a major concern for those involved with carbon or greenhouse gas (GHG) offsets markets, particularly projects attempting to avoid or reduce deforestation and forest degradation (REDD). For these reasons, some people are worried that stacking could do to environmental markets what credit default swaps did to derivatives by causing a crash when transactions are realized to have little connection to their underlying values (see Kenny, 2010).

Summary of Outstanding Issues:

Despite heightened attention and import given to these issues, there is a paucity of published information on the concepts of bundling and stacking. A recent search for the terms "ecosystem service* bundling" and "ecosystem service* stacking" in the "topic section" of peer reviewed papers returned a total of 15 hits, with only a fraction of these records actually being relevant to the topic (Web of Science, March 2012). However, a variety of recent publications not catalogued on the Web of Science have been released in recent years and address the topic in significant depth and detail (such as Bianco, 2009, Fox, 2007, Fox et al, 2011 Le Rocco and Deal, 2011, Cooley and Olander, 2011, and others). Nevertheless, guidance is still needed with respect to how policies and regulations should address bundling and/or stacking in the United States and in other countries where these markets are forming. This guidance is urgently needed as Cooley and Olander (2011) point out: "While policy makers, researchers, and practitioners debate what constitutes stacking and whether it should be encouraged or discouraged, project developers and landowners are left to wonder about the validity of current projects and the potential to participate in future ecosystem programs".

Firstly, to reduce confusion there is need for a common lexicon of bundling and stacking, although considerable progress is being made in this arena (see Fox et al. 2011). In some cases bundling and stacking are used interchangeably (as discussed in Wunder and Wertz-Kanounnikoff, 2009) and, in other sources, additional, related terms such as layering and piggy-backing have been used (Wunder and Wertz-Kanounnikoff, 2009). As ecosystem service markets operate across political boundaries and spatial scales, it is important to have a generally agreed upon definition of these terms.

Much of the in-depth discussion to date on these issues has focused on challenges for private landowners within the United States operating within specific, fairly rigid regulatory frameworks (Cooley and Olander, 2011) and have addressed stacking primarily (LaRocco et al. 2011, Fox et al. 2011) . However, interest in these issues is growing in developing countries, such as Vietnam and Madagascar, where land ownership may be less clear or non-existent in some cases and where regulation related to these issues is just developing (Wunder and Wertz-Kanounnikoff, 2009(Wendland et al., 2010). Without an analysis of the pros and cons of

bundling and stacking from the perspectives of the many different, potential stakeholders who could be involved, it is difficult to assess what types of regulation are needed to support effective projects; the conditions in which the risks and/or costs are too high for poor rural farmers in developing countries; and/or the conditions in which bundling and stacking provide clear, sustainable financing opportunities for ecosystem service management. These issues are complex and challenging because the sellers could range from a small-scale farmer, a community who collectively manages a forest resource, the government, to a wealthy private land owner, for example, and, thus, perceived risks and opportunities will vary greatly with each stakeholder. Similarly, buyers could include governments, NGOs, investors, individuals, or extractive industries intending to offset their impacts and, thus, would have different motivations and concerns about buying bundled and/or stacked credits. Furthermore, marine and terrestrial environments could present very different challenges with respect to these issues.

This meeting hopes to address some of these issues by convening a group of experts to explore:
1) Under what conditions would bundling and/or stacking maximize ecological and economic returns?
2) What are the major challenges and opportunities for implementing and leveraging these approaches?
3) In places where bundling and/or stacking may be a viable option, what resources, information, and guidance are needed for successful implementation?

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Ambatovy, Madagascar: a case study for considering bundling and stacking of ecosystem services

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Note: This case study is presented here not as a 'fait accompli' case of stacking/bundling of ecosystem services, but as a situation where stacking and bundling could be relevant. As such, it may offer a good basis for discussing the potential benefits and risks, costs, and other issues and questions relating to stacking and bundling in the context of a real case (see also some key questions at the end).

Introduction

The case study focuses on Ambatovy, an enterprise in Madagascar that is developing a US$ 5.5 Billion large-tonnage nickel and cobalt mine and processing plant (Ambatovy, 2012). Ambatovy is owned by four shareholders: Sherritt International Incorporated (40%), Sumitomo Incorporated (27.5%), Kores (27.5%) and SNC-Lavalin Incorporated (5%). The project was permitted in December 2006, construction began in early 2007, and the project is due to go into full production in 2012. The expected lifecycle is about 30 years, but operation beyond this is possible.

Major physical components of the development project include: the mine site (total footprint is ~2126 hectares, of which ~1800 ha is forest clearance), a 220km slurry pipeline linking the mine and the processing plant, the processing plant (including refinery) and tailings management facility on the east coast, and other supporting infrastructure (e.g. port extension at Toamasina (Tamatave), new roads, etc.). The project extends over two of Madagascar's twenty-two regions, from the mine site (~1000m a.s.l.) on the eastern escarpment near the town of Moramanga to the industrial complex 130km to the NE, in the seaport city of Toamasina (see map on next page).

Given the sensitive location of the mining development (Madagascar is recognized as a 'biodiversity hotspot', Myers et al., 2000; CI, 2007) and significant residual impacts on the region's unique biodiversity, Ambatovy publicly and voluntarily committed to developing a high quality biodiversity offset[2] in the context of adhering to the mitigation hierarchy[3] and IFC Performance Standard 6 (PS6). Here, the specific aim is to achieve measurable conservation outcomes that deliver no net loss (NNL) and a possible net gain of biodiversity through offsetting and residual losses following impact avoidance and minimisation, and mine site restoration. While the project's ESIA (MINEVEF/ONE Permit # 47/06, December 1, 2006) sets out required on-site mitigation measures, the offset programme goes beyond national impact avoidance and minimization requirements.

Ambatovy's biodiversity policy, developed and endorsed by its shareholders, includes the following relevant commitments:

- *"... to cause no net harm to biological diversity where we operate, to mitigate unavoidable impacts, and to practice responsible closure procedures;*
- *... to assure the conservation of habitats, flora and fauna, using all reasonable actions and technologies;*

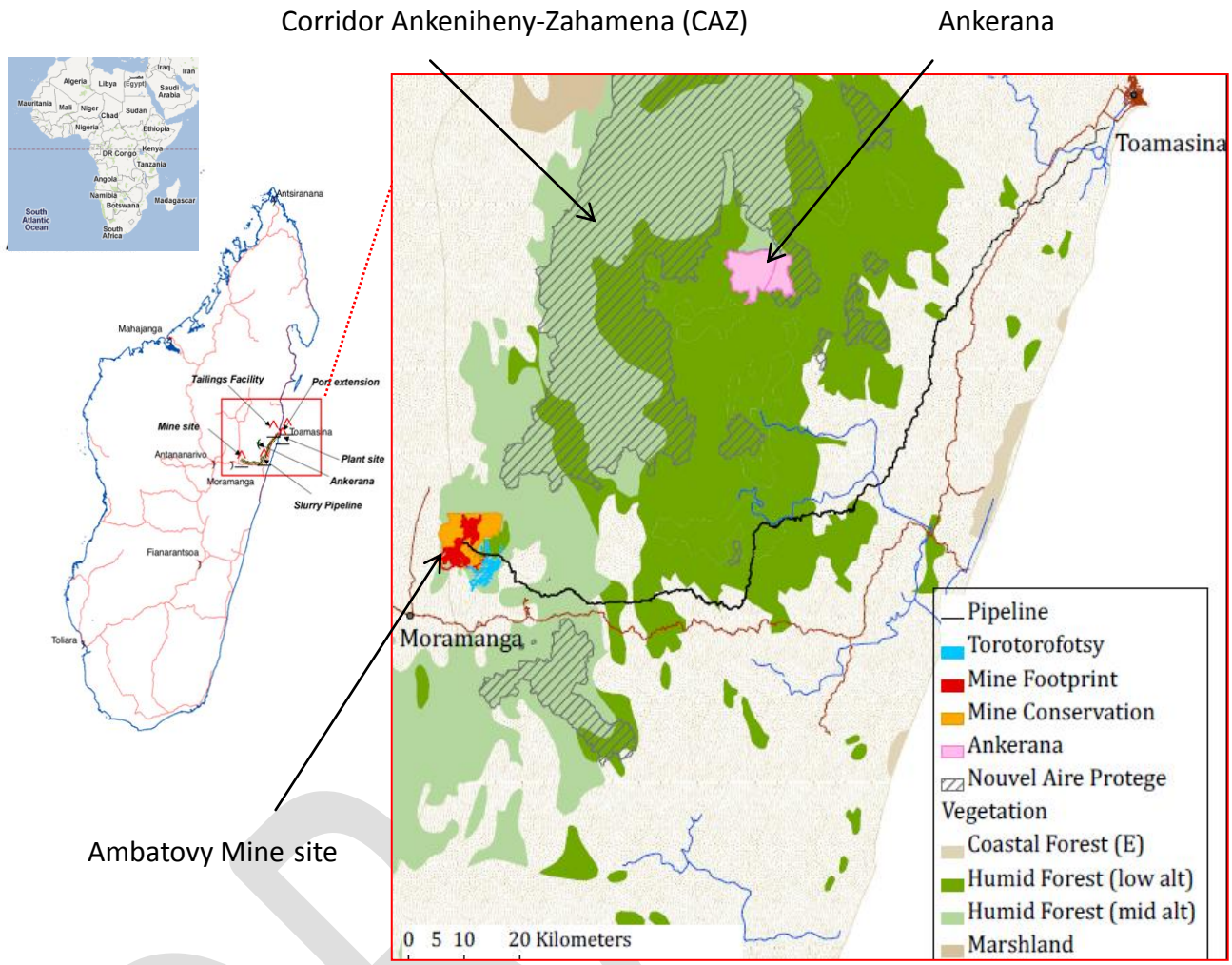
[2] Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development[2] after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity (BBOP, 2009).

[3] Rigorous adherence to the mitigation hierarchy is important to limit negative impacts on biodiversity and ecosystem services, and involves avoiding and minimizing impacts to the greatest extent possible, restoring impacts, and then considering biodiversity offsets for residual impacts on biodiversity (see also BBOP, 2012).

- *... to ensure responsible attention to the maintenance and, where possible, enhancement of biodiversity in the best interest of our business, the communities in which we operate, and the world at large."*

Ambatovy joined the Business and Biodiversity Offsets Programme (BBOP) as a pilot project in order to pioneer current (and developing) best practice in biodiversity offset design and implementation (see pilot project case study, BBOP, 2009). The business case for undertaking the offset is detailed in the case study. Amongst the key factors listed are: managing the company's reputational risks in this specific setting, investor confidence and requirements (see below), and strengthening relationships with local communities, government regulators, environmental groups and other stakeholders (BBOP, 2009). Ambatovy's principal financial lenders[4] require general compliance with the IFC Performance Standards (PS) and specifically PS6 on Biodiversity Conservation and Sustainable Natural Resource Management (including the requirement for no net loss of biodiversity and offsetting residual losses).

[4] Ambatovy is financially supported (US$ 2.1 billion in debt financing) by a number of lender banks, most of which have adopted the Equator Principles. Lenders include the African Development Bank (AFDB), Export Development Canada (EDC), Export-Import Bank of Korea (K-EXIM), the European Investment Bank (EIB), the Japan Bank for International Cooperation (JBIC) and various commercial banks such as Société Générale and BNP Paribas (http://www.ambatovy.com/docs/?p=179).



The proposed biodiversity offset comprises a composite of sites, including part of the Ankerana massif (an area of ~6800 ha about 70km to the N of the mine site), conservation forests located within the mining concession (underpinned by a land lease secured for the purpose), and several other potential sites. The final offset design is not yet complete, and will depend on the completion of biodiversity assessments at the proposed offset sites to determine an offset that will meet Ambatovy's no net loss of biodiversity commitment for the mining development. To begin the process of independent verification, the company plans this year to undergo an initial second-party trial audit of the biodiversity offset using the recently published BBOP standard (BBOP, 2012). This will be to assess the offset's current status and Ambatovy's progress towards meeting the standard and its NNL of biodiversity goal.

Madagascar is listed by the United Nations as being amongst the 'Least Developed Countries' (LDCs), a term that describes the world's poorest countries (UN, 2011). The country's economy has suffered as a result of the on-going political crisis, recently marked by the 2009 *coup* ousting then President Marc Ravalomanana. These events were compounded by the 2008-09 global economic slump, so that the economy shrunk by 3.7% in 2009. Growth of 0.3% in 2010

was driven by the extractive industries (projects such as Ambatovy, and Rio Tinto's QMM), and by a recovery in tourism. Poverty levels are high throughout the country (more than two-thirds of the population lives on less than USD 1.25 p.d.) and living standards have deteriorated over the last 40 years as the economy has grown more slowly than the population. Malnutrition is particularly high, affecting 35% of the population (African Economic Outlook: Madagascar, 2011).

A range of past and present land use practices – including 'slash and burn' agriculture - have led to a rapid decline in the country's native biodiversity: e.g. between 1990 and 2000 an estimated 8.6 % of forest cover was lost (Harper et al., 2007). And, while Madagascar has pledged to expand the current system of protected areas to cover at least 10% of the country's total area, funding for this is inadequate in the short and long-term (Carret and Loyer, 2003, in Wendland et al., 2010). Further, traditional protected areas also do not necessarily prevent deforestation (Ingram and Dawson, 2005) – for example if local communities are not involved or compensated. Payments for ecosystem services (PES) have been suggested as a potentially powerful conservation tool, especially if different services could be beneficially 'bundled' (or stacked?) in biodiversity priority areas – for which there certainly appears to be plenty of opportunity as demonstrated by Wendland et al. (2010).

At present, the regulatory context for PES in general and biodiversity offsets, in particular, in Madagascar is essentially a voluntary one. With regards to biodiversity offsets in the mitigation hierarchy, the following is relevant: Investment projects in Madagascar must be compatible with Malagasy environmental regulations, as governed by the MECIE (*Mise en Compatibilité des Investissements avec l'Environnement*) Decree N° 2004-167 modified. The decree is enforced by the environmental regulator, ONE (*Office National de l'Environnement*) according to stringent guidelines for Environmental and Social Impact Assessments (ESIA). While the terms of reference for an ESIA typically require stringent mitigation of impacts, biodiversity offsets are not included in the text. Note, however, that the Government of Madagascar became aware of biodiversity offsets through interactions with environmental NGOs in 2005 (e.g. WWF, CI, WCS) and with the BBOP Secretariat at a presidential audience in 2006. Biodiversity offsets were subsequently referred to in the Madagascar Action Plan 2007 – 2012.[5]

Further, with regards to PES, several REDD+ projects are at various stages of development throughout the country. The most advanced of these is the Makira Forest Project, which is located in the Northern part of the country and led by the Wildlife Conservation Society (WCS) working with the local communities, the Government of Madagascar and other partners. In addition, Conservation International (CI) has also been actively developing the CAZ (Ankeniheny-Zahamena Corridor) Project over the past two or so years.

The Relevance of Bundling and/or Stacking at the Site

[5] Priority Projects and Activities # 3 "Develop a policy for mining companies and logging companies for biodiversity offsets and other mechanisms and incentives for environmental protection"

With regards to investigating a potential 'bundling/stacking' model and the related questions of possible benefits and costs, advantages and disadvantages, the situation in the Ambatovy situation is as follows: The company's principal commitment is to deliver a high quality biodiversity offset which will address and compensate for its residual impacts on biodiversity. Thus, the company has a demand for biodiversity 'gains' (to meet the NNL or net gain goal) as reflected in the choice of the proposed composite offset sites. The relevant conservation gains are to be supplied primarily through 'averted loss' conservation actions that support and ensure the protection of high priority biodiversity areas (i.e. mostly intact standing forests) that are under threat of loss to tavy agriculture and other land uses, and possibly also – though to a lesser extent - through the restoration of previously degraded land. Part of the offset consists of forested lands leased by Ambatovy from the government, but most lies on non-titled lands owned by the government[6]. This then sets the specific context for considerations relating to potential bundling/stacking of multiple ecosystem services in the light of a biodiversity offset (see also 'BBOP Discussion paper on Multiple Benefits', von Hase & ten Kate, 2010).

The biodiversity offset, as defined above and in the case of Ambatovy, is essentially a 'bundled product' where associated ecosystem services and values are integral to the biodiversity '*debit-credit*' or loss-gain calculation (this measures residual biodiversity *losses* relative to the offset *gains* needed to achieve a no net loss outcome). As part of the 'bundle' of biodiversity gains forming part of the offset, other ecosystem services (e.g. Carbon or water related services) may be delivered, but they are not necessarily explicitly quantified or valued (e.g. to achieve a market premium). In other words, biodiversity, carbon, water or specific ecosystem functions are not disaggregated. They are implicitly part and parcel of the compensation that is needed to offset the residual impacts on biodiversity. These services and benefits can thus be said to be 'piggy-backing' on the key biodiversity values (assessed in the relevant offset metric), though some of these services could, of course, be separately quantified[i].

Therefore a central issue that would need to be considered with regards to any stacking/bundling model, is the quantification of the various services and benefits. Biodiversity offset loss-gain calculations can be undertaken using various currencies, with varying levels of precision. What is included, and what is left out of the currency and the associated accounting model has important consequences for whether (and which) additional ecosystem services could feasibly be 'credited' and considered 'additional' in a separate transaction. In the past, common practice was to quantify biodiversity offsets using affected land area as the basic currency, usually coupled with some ratio or multiple of that area. This is increasingly criticised as inadequate (see BBOP, 2009, 2012) and other currencies, such as area x biodiversity condition, which better capture biodiversity composition, structure and function are becoming more widely advocated and used.

Ambatovy and others (e.g. local communities, NGOs etc.) who may be involved in providing the biodiversity offset gains and/or other ecosystem services are naturally interested in the possibility and feasibility of stacking/bundling ecosystem services: if feasible, any revenue

[6] See Wendland et al., 2010 for a pertinent discussion

derived from other ecosystem services could complement the company's direct financing of the biodiversity offset (e.g. through an endowment fund) and would thus expand the options for long-term sustainable financing of these areas. In this regard, income from certified carbon credits is the most relevant and topical issue as that there is a demand for such credits, and these could be used by Ambatovy itself and/or provided to others in the voluntary carbon market. *However, this would require a reliable model for stacking/bundling (and explicitly quantifying) multiple ecosystem services and benefits in the present context, which is principally voluntary rather than regulated. Thus, while there a) seems to be ample opportunity for targeting areas where ecosystem services can be 'bundled' (Wendland, et al., 2010) and b) interest exists amongst various players in a possible system of multiple ecosystem service credits, the model for so doing is not as yet clear*. The feasibility of such a system depends partly on resolving questions of additionality (and other requirements under the BBOP Biodiversity Offset Standard, VCS, other Carbon standards), resolving the company's various commitments, selection and quantification of a set of relevant ecosystem service credits (and debits), and the perspectives and plans of a range of stakeholders (government, companies, NGOs, local communities).

As there is no regulated carbon market in Madagascar, any credits generated would be for the voluntary carbon market and could be delivered/certified under various different schemes. Several REDD+ projects are at various stages of preparation in Madagascar: For instance, WCS has been leading on the Makira project in the North for several years and this is by far the most advanced REDD+ project in the country. The Ankeniheny-Zahamena Corridor (CAZ) is one of the REDD+ projects that Conservation International is developing with partners. The CAZ may be particular relevance here as Ankerana (slated as a central part of Ambatovy's composite biodiversity offset) falls on the outskirts of the CAZ and is included in the broader area proposed for REDD+ (see map above).

Rationale for Bundling and/or Stacking Approaches

The main drivers for designing and implementing the biodiversity offset, as Ambatovy's primary commitment, are mentioned above. (Note also that no deliberate choice regarding a stacking/bundling approach has been made: this is not an issue that the company has explicitly considered in its own context, given the early stage of the debate on and study of the 'theory and practice of stacking/bundling' in international circles and in regulated markets such as the United States.) However, in this specific context, two main drivers might justify adopting a defensible stacking/bundling model that would explicitly cater for a range of ecosystem service credits:

1. The first more 'strategic' reason is to develop diversified revenue streams and expanding funding opportunities to ensure the long-term conservation of the biodiversity offset, provided this is aligned with best practice for biodiversity offsets such as the BBOP Standard.

2. The second reason lies in the potential for spatial overlap, i.e. a situation where different actors (e.g. Ambatovy and CI) have identified the same areas for different ecosystem service schemes (e.g. biodiversity offset, REDD (+) – e.g. Ankerana could be part of the biodiversity offset alone, part of the greater CAZ, or another model altogether).

The perceived benefits and risks are uncertain at this stage. They have not been investigated with any of the stakeholders in practice, so the response here is brief. However, a useful and relevant analysis is provided in Wendland et al., 2010, with regards to the operation of PES schemes (and 'bundled' services) in Madagascar.

For the company, advantages of a formally stacked/bundled model might include greater effectiveness and efficiency (financial, spatial, and in terms of conservation outcomes). Greater efficiency and effectiveness would be due to the possibility of increased PES investment and revenue derived from other external sources to contribute to the long-term conservation of the forest in question. This would, however, depend on various factors, including the market potential and performance (e.g. of international carbon markets), who would purchase which credits, when and for how much, who else is offering credits, the investment required to set up a specific PES scheme etc.

For the communities living in and around the areas in question, the nature of benefits and risks from stacking and bundling are also difficult to ascertain without any more detailed information. The benefits of a stacked/bundled model would presumably include more sustainable alternative livelihoods (increased revenue) and the benefits related to ecosystem services from the forest remaining intact (see also Wendland et al., 2010).

Some commonly advanced arguments for and against bundling and stacking, as well as some of the challenges, are summarized in the table below. These are taken from a discussion paper on biodiversity offsets and multiple benefits (von Hase & ten Kate, 2010) and based on Jones et al., 2009 (based on a US context, which is highly regulated. While it's important to understand these arguments in that context, they are of some relevance here).

System	Advantages	Disadvantages, and risks	Challenges
Stacking (e.g. global carbon markets)	-Potential for multiple revenue streams for service providers (diversified portfolio so greater resilience over time, total income from different credits may be greater than if services were bundled). -Buyers often only want a specific service. -Smaller markets may become more viable. -Market flexibility. -Valuing, measuring and accounting for individual services may lead to greater precision and better monitoring (good for service delivery and	-Substitution effect: Service providers optimise some elements or services in response to the market and sub-optimise others -Ecological requirements and integrity is therefore compromised. -Only one market may develop and other credits may not sell. -Perverse incentives develop for services that are not valued or undervalued.	-Managing additionality and proper transparent accounting systems to prevent double dipping, etc. -Potentially high administrative costs -Property rights for services and goods may need to be clearly established.

	for ecological needs).		
Bundling (e.g. wetlands in the United States under the Clean Water Act, biodiversity offsets)	- May be consistent with an ecosystem approach: acknowledges that individual services cannot be disengaged from the natural system (biodiversity underpins ecosystem services) in which they originate. - Regulated and unregulated services are incorporated, so likely to be better for ecological integrity and functioning. - More consistent with the way land managers tend to manage their land.	-Difficulty with locating buyers for bundled credits (different buyers want different credits, few want 'everything') and thus with establishing a market. - Certain unmeasured services may be disregarded and sub-optimised (even though they are not explicitly sold).	- Systematic, structured credit measurement and credit valuation. - Adequate monitoring of ecological outcomes. -Ensuring appropriate, required outcomes according to performance standards.
Note: these systems could be merged or combined in different ways to get the best ecological outcomes, and to meet the requirements of those supplying credits (service providers) and those with a demand for these credits.			

Major Opportunities and Challenges to Bundling and Stacking

The approach chosen by Ambatovy, for the time being, is to focus on its primary commitment of designing and implementing the biodiversity offset (and supporting this work through activities such as undertaking a trial assessment against the BBOP 2012 Biodiversity Offset Standard). The reason for the biodiversity offset commitment, as noted previously, is because it offers business benefits such as risk management, license to operate, and access to finance. While best practice on biodiversity offsets has consolidated over the last year (with the release of the IFC's revised PS6 and BBOP's Standard, 2012), best practice in bundling and stacking remains unclear. This represents a barrier for developers such as the Ambatovy Project, in that the options, feasibility, risks and cost-benefit balance of a stacked/bundled model for multiple ecosystem services are highly uncertain. In particular, these issues require further research (e.g. pre-feasibility study of whether and how biodiversity offsets and/or other PES schemes could be integrated) and learning by the broader international community working on stacking/bundling of ecosystem services. Given the significant uncertainty (e.g. relating to the global carbon market, the evolution of REDD+ agreements in Madagascar and internationally and the state of play of other carbon-offset related schemes among other issues), relevant long-term decisions on stacking/bundling of ecosystem services are thus difficult for individual actors to make. This applies perhaps particularly to the private sector, which is strongly informed by risk determinations and needs more certainty to take any key decisions.

Stakeholders Involved and the Perspectives of Each

Below is a list of stakeholders whose perspectives would be relevant as part of investigating the concept of stacking and bundling in the context such as presented by Ambatovy. However, since this is a somewhat hypothetical case study, presented with the aim of discussing how stacking and bundling may be usefully approached in this situation, real stakeholder perspectives cannot be outlined (as they haven't been assessed).

- The company
- The local communities
- The partners and surrounding NGOs (e.g. CI)
- The government
- The lenders (banks providing project finance)

Quantifying and Tracking Multiple Benefits

Multiple ecosystem services and benefits have not been explicitly quantified or documented by Ambatovy. Instead, the main focus is on the various facets and components of biodiversity pattern and ecological processes specifically (e.g. relating to species, ecosystems, terrestrial and aquatic biodiversity, etc.). Thus, detailed biodiversity studies, and calculations of biodiversity losses and gains, have been undertaken to date, and continue to take place as additional data are collected. The biodiversity offset has been documented in the 2009 BBOP case study for Ambatovy, where the predicted losses due to the mining project and expected gains from the offset are partially quantified. This process is on-going, as field studies at various impact and offset sites continue, and the principal metric for 'biodiversity losses and gains' is an 'area x condition' metric. There are also several other publications that detail, describe and track the biodiversity at the mine site and at other project locations (e.g. 2010 publication of Malagasy Nature, in the EIA undertaken for the project in 2006, the Company's 2011 Sustainability report, several peer-reviewed publications – e.g. on lemurs, and conference presentations).

Note on biodiversity offset quantification: As explained above, a central component of offset design is to determine the nature and size of the biodiversity offset, by quantifying the losses due to the development, and the required gains, in order to achieve NNL or a net gain for biodiversity. Thus the focus is on biodiversity, first and foremost, and as the definition indicates, on all of the components and values of biodiversity (i.e. 'intrinsic' values – species, communities, ecosystems, and social, cultural values of biodiversity). What matters very much is the metric used to assess biodiversity losses and gains- often this is a variant of the area (in ha) and condition of affected biodiversity components (or of some biodiversity surrogate such as vegetation). With regards to social and cultural values of biodiversity, which are also assessed as part of a biodiversity offset, different measures and metrics are usually applied, such as economic valuation tools (see BBOP, 2009b). This involves working with the relevant affected stakeholders, such as local communities, and the process depends very much on what they may value. The costs and benefits associated with the development project and with the offset – as ascertained through these stakeholder engagements - are evaluated and balanced to ensure that the stakeholders are at least as well off following compensation awarded, as without the development project or offset. In general, most 'ecosystem service' values of

biodiversity are treated as an integral part of the 'biodiversity bundle of values'. Thus, Carbon- or water-related values of biodiversity are not necessarily separately assessed and quantified (unless the chosen metric specifically does so). The assumption is that if the offset meets the NNL goal from a biodiversity perspective (as assessed by the chosen metric, and loss-gain calculation), the same or similar related ecosystem services values will be delivered.

With regards to other initiatives in the region (e.g. REDD+ related), for the CAZ CI has assessed the anticipated carbon credits in line with Voluntary Carbon Standard (VCS) methodologies, and associated biodiversity has been documented in line with CCBA requirements. This information is however not yet available in the public domain.

Data and Results

Given the hypothetical nature of this 'case study', there are no practical results or data relating specifically to bundling/stacking to demonstrate advantages or disadvantages. Note however, that this could be an interesting exercise, to follow on from the case presented here, to investigate what the advantages and disadvantages (and costs and benefits) would be of different stacking/bundling scenarios or models in a specific situation such as Ambatovy. (Note that, with regards to Carbon credits from REDD(+) specifically, the potential revenue that may be generated also depends on many factors that are still quite uncertain – e.g. the size and value of the market in the long term, the terms of the benefit-sharing arrangements with the Malagasy government, etc.)

Theoretically, these approaches could *add resilience through diversification and could result in increased conservation/better management of the targeted ecosystem services. However,* in practice, it is too early to tell as stacking/bundling is only a hypothetical consideration in this 'case study' at this point in time.

Key Questions

The following set of questions would be interesting to explore with regards to the 'case study' presented here:

- On the basis of the facts presented, what specific options and models for bundling/stacking ecosystem services might be available and of benefit to Ambatovy, and its partners and stakeholders?
- What options could be considered the most suitable for Ambatovy and partner organizations to pursue given the project and biodiversity offset context, as well as the wider regional and national context?
- What particular challenges would need to be taken into account by Ambatovy?
- What steps could be taken to research some of the key questions (e.g. additionality requirements, alignment of different standards and methods for the delivery of ecosystem services and benefits, quantification of different services, 'state of play' and potential of relevant markets, etc.)?

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San Andres Island, Colombia: A Case Study of Stacking and Bundling in the Marine and Coastal Context

Prepared by Winnie Lau, MARES/Forest Trends

Background to Bundling and Stacking in the Marine Context

Marine and coastal ecosystems provide many different ecosystem services simultaneously and collectively. In particular, coastal ecosystems, where the land meets the sea, are considered some of the most productive of all ecosystems on earth. Often, the delivery of ecosystem services by one habitat type / ecosystem is tightly linked to the health of another. For example, mangroves, seagrasses, and coral reefs, together form a network of nurseries and feeding grounds for different life stages of fish, and loss of any one of these habitats would negatively impact these fish populations (Mumby *et al.*, 2004 and Saintilan, *et al.*, 2007). The complexity and connectedness of marine and coastal ecosystems may make it desirable to develop bundled or stacked payment for ecosystem services (PES) schemes that can maximize the overall production of ecosystem services, as well as the payments toward their maintenance.

True marine and coastal PES schemes with bundling or stacking are yet to be developed, but PES-like mechanisms with bundling can be found. In Tanzania, the user-financed marine protected area (MPA), Chumbe Island Coral Park, is operated by Chumbe Island Coral Park Ltd. (CHICOP) (The Nature Conservancy). CHICOP has a lease agreement with the government of Zanzibar to operate an eco-tourism park on the island in exchange for managing (and paying for the management of) the 30-hectare coral reef sanctuary surrounding the island and the 22-hectare coral-rag forest reserve in exchange. Through CHICOP's management activities, over-fishing and destructive fishing practices have been reduced in the MPA and the health of coral reefs is among the best in the region. The "buyer" in this case is both the buyer and the resource manager, a role usually played by the provider/seller. The Zanzibari Government is essentially leasing Chumbe Island to CHICOP with conditions. This example has elements of a PES scheme, but lacks the essentials of a true PES scheme.

The use of PES for marine and coastal protection is still in its infancy. As a result, most of the energy has focused on increasing the number of on-the-ground pilots, rather than stacking and bundling of multiple services. The MARES Program of Forest Trends has, likewise, been working with local partners to design and implement PES schemes with a focus on a single service. Here, we describe one such collaboration in San Andres Island and discuss the potential for stacking and bundling.

Main Actors:

- CORALINA (Corporation for the Sustainable Development of the Archipelago of San Andres, Old Providence, and Santa Catalina – local environment authority)
- Hotel Sector
- Tourism Sector
- Fishing Cooperative
- MARES Program, Forest Trends

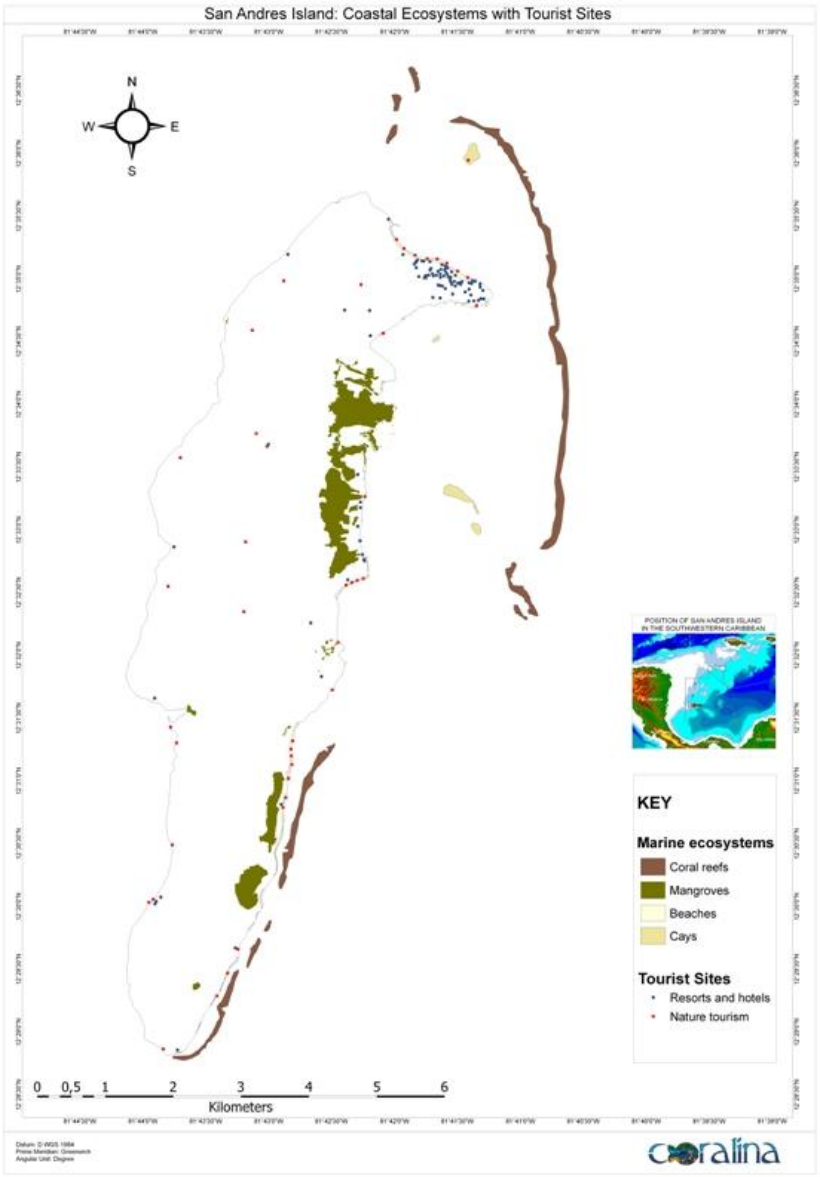
The San Andres Archipelago is one of the most extensive coral reef areas in the western hemisphere. The coral reefs, banks, and atolls are especially complex and productive because of the open ocean location, currents, and wave action. It boasts of globally and nationally important biodiversity in corals and associated species, such as 160 species of reef fish, 140 species of sponges, seabirds, and several species of endangered turtles, among others. To protect this significant marine biodiversity, Colombia declared its first marine protected area (MPA) – the Seaflower MPA, currently the largest MPA in the Caribbean and 7th largest in the world. Through several grants, the Corporation for the Sustainable Development of the Archipelago of San Andres, Old Providence, and Santa Catalina – CORALINA, the regional autonomous representative of Colombia's National Environment System for the archipelago, led development of the MPA, including putting in place multiple-use zoning and drafting an integrated management plan (IMP) through a highly participatory process with local stakeholders from all sectors.

Despite the formal establishment of the Seaflower MPA and development of the Integrated Management Plan (IMP) in 2005, human activities continue to threaten Seaflower's ecosystems. The major impacts derive from overexploitation of marine resources (from artisanal fisheries, national fishing fleets, and subsistence gathering), unsustainable tourism practices, and contamination from land-based activities. Results of research and monitoring since 2006 revealed that the condition of most resources has remained the same or has even declined since the MPA was established. For example, in regard to species, a spiny lobster stock analysis showed a fishery that is stable but at high risk of over-exploitation. As for ecosystems, monitoring showed that coral condition has remained generally the same, but the condition of popular reef sites for divers and tourists has declined. Exceptions are mangrove coverage that has grown and queen conch populations that show signs of recovery, both as the result of management, compliance and enforcement, and education. The main challenge at this point is the timely and effective execution of the IMP, which can be achieved if CORALINA's management capacity is strengthened and long-term financial sustainability is realized.

The specific objective of this project is to develop and launch a pilot initiative of marine PES on the main island in the archipelago, San Andres Island, as part of a suite of sustainable financing mechanisms for the Seaflower MPA, as well as raising awareness of the importance of coral reefs and other marine ecosystems and the ecosystem services they provide to safeguard human well-being. This project fits into a strategic principle of the Seaflower MPA IMP: revenue generation from conservation-oriented activities (such as eco-tourism, scuba diving, and regulated sports fishing) within the MPA to ensure independence of Seaflower's management. Specifically, CORALINA is looking to develop sustainable income-generating mechanisms that will allow MPA management activities to be self-financed.

The design of this PES scheme centers around CORALINA as the service seller because of its sole authority to manage conservation and sustainable resource use in the MPA. The targeted buyers are the resort/hotel industry for the use of the MPA's white sand, coralline beaches and coastal waters – by engaging them in protecting the coral reefs, the crucially important parrot fish, and associated ecosystems, e.g., seagrass beds and mangroves, that produce and maintain

the sand on the beaches, as well as maintaining coastal water quality that is important for the health of these ecosystems. Potential buyers from other sectors will also be engaged as they are identified and depending on their interest.



Bundling and Stacking Options in San Andreas

As noted above the Seaflower MPA boasts some of the highest biodiversity in the Caribbean region. It would be important for both the long-term health of this MPA as well as the economy of San Andres Island to protect the shoreline and the overall biodiversity of region, in addition to the fish populations for the livelihoods of the native islanders.

The specific PES scheme MARES is designing focuses on beach protection on San Andres Island as the service of interest with the hotel sector as the targeted buyer. “Sun, sand and beach” tourism makes up about 80% of the economy of San Andres Island and beaches are the main tourist attraction. The hotel managers and owners on the island have expressed serious concern about beach erosion on the island and are eager to find solutions. The watersports industry, compared to the hotel industry, is much smaller, but the tourism operators are also concerned about the health of the coral reefs and have also expressed interest in finding solutions. There is potential opportunity to include the watersports industry as buyers in a bundled or stacked PES scheme.

Currently tourists must purchase a mandatory tourist card (US $50) prior to boarding a vessel bound for the Island. Part of the fees collected is directed toward CORALINA for environmental management. As a supplement to the tourist card, CORALINA is conducting research on developing an MPA entrance fee, to be collected from tourists entering Seaflower MPA, and an annual operating license fee, to be collected from private businesses, particularly the watersports businesses. While these are not explicitly PES schemes, they are PES-like mechanisms on top of which the beach protection PES scheme can be stacked (or vice versa).

Moreover, CORALINA is developing a trust fund that they hope will attract international donor funding for the purpose of protecting Seaflower and its biodiversity, much like the International payment for ecosystem services (IPES) schemes that have been proposed (UNEP-IUCN, 2006).

Rationale for this Approach

Like with many MPAs, insufficient financing threatens the effective implementation of any management plan. The Seaflower MPA, likewise, is suffering from a serious lack of technical and financial resources since its declaration in 2005, with no funding from national or local government, meaning that the MPA has remained dependent on grants with implementation being project-driven. The key to MPA effectiveness and coral conservation is for Seaflower to become financially self-sustainable. From an economic analysis, CORALINA identified that they must develop multiple streams of revenue to finance the operation of the MPA because no single stream (besides grants) could be identified to meet the full costs of managing the MPA. Through a Global Environment Facility/InterAmerican Development Bank project, implemented, CORALINA has begun developing a suite of financial mechanisms that will generate consistent, reliable revenue to achieve self-sustainability (100% of annual operating costs) for the management of the Seaflower MPA.

PES and PES-like mechanisms as described above form part of this package of financing. The current goal is for the beach-protection PES scheme to generate 10% of the funds needed for the operating budget. A bundled scheme or several stacked schemes can help increase the financing generated through PES.

Opportunities and Challenges

In San Andres Island, there are several challenges facing the development of PES schemes, in general and for bundling and stacking. The first is that it is not clear whether the current legal framework in Colombia allows for PES implementation. It is possible for CORALINA to develop various entrance and operating fees (pending approval by its board), but it is not known yet whether it can engage in true PES schemes regardless of whether it is stacked or bundled.

The second is stakeholder acceptance. In April 2011, MARES, in conjunction with CORALINA, held a stakeholder meeting with the private sector and government to discuss the findings of a socio-economic study that was conducted to examine the potential economic impact to the tourism industry if significant beach loss were experienced. In that meeting, the stakeholders were introduced to the concept of ecosystem services and PES. Some of the private sector representatives were not receptive to the idea of payments at all while others were interested in providing in-kind help with monitoring and surveillance. It will likely be more acceptable to the various stakeholders for a bundled scheme because it will be easier to understand than stacked schemes with their intricacies of additionality, verification, and multiple payments.

In addition, social tension exists between the native islanders and the owners of the tourism businesses (usually Colombians from the continent). There is potential for a PES scheme to be perceived as restricting access to natural resources (particularly fishing) by the native islanders. Any PES scheme must carefully consider equity issues.

The third is scientific uncertainty. At present the ability to measure ecosystem service delivery is still nascent for marine and coastal environments. Because marine and coastal environments are so tightly interconnected and are also connected with the land, it will be difficult to clearly separate out ecosystem services and be able to quantify them. While this poses challenges for a single-ecosystem-service PES scheme, it poses even greater challenges for stacked PES schemes. How can one quantify the additional services for a second PES scheme if it is difficult to even quantify one? Because of the ecological complexity, a bundled approach would be easier to show overall health of an ecosystem than to separately quantify distinct ecosystem service delivery.

Stakeholders Involved and the Differential Risks/Benefits of Each

CORALINA as the service provider and as the environment manager for San Andres Island would likely prefer a bundled approach over a single-service or stacked approach because as a biosphere reserve, it is important to protect all of the ecosystems and ecosystem services within Seaflower. A bundled approach would allow better integrated management of the resources as well as generate a larger amount of funding through the PES scheme. It would also be administratively cheaper than several stacked schemes. However, climate change impacts to the Island as well as geological changes (tilting of the Island) can pose significant risks to service delivery whether they are single, stacked, or bundled. Coral bleaching due to climate change is already occurring in these waters. Continued coral bleaching will affect the biodiversity of the reefs and the protection the fringing reefs provide to the shoreline and, over the long-term, the

ability of the corals to be a source of sand. Being situated in the Caribbean, San Andres Island is in the hurricane corridor, and hurricanes can severely damage the coral reefs and seagrass beds, and erode the shorelines. Moreover, no management activities can prevent the geological changes that are resulting in the subsidence of one side of the Island and the rise of the other.

For the potential buyers, a bundled approach can benefit multiple sectors, e.g., the hotels and tourism operators; however, as most tourists visit San Andres for only the beaches, the hotels are less interested than the diving and snorkeling operators are in protecting overall biodiversity. As expected, the hotels are less interested in a bundled scheme even though they are the main revenue generators on the Island. From the hoteliers' perspective, maintaining beaches through better management of the marine environment is also a riskier investment than engineering solutions, such as sea walls and beach renourishment (bringing in sand from other locations) although these engineering solutions are likely to impact negatively on biodiversity. While the dive and snorkel operators would like integrated management through a bundled scheme, they are less likely to be able to make significant payments (beyond in-kind payments) towards the management activities needed because the diving and snorkeling industry is a very small industry. They are, however, more reliant on maintaining higher biodiversity.

Quantifying and Tracking Multiple Benefits

This project is still in the design and development phase and, therefore, has not begun quantifying or tracking of ecosystem service benefits. We have begun identifying the potential indicators and are beginning to construct a baseline. The potential baseline and performance indicators are: beach width, coral and seagrass cover, extent, and health, and water quality. CORALINA is already collecting some of this data in their regular monitoring activities. We anticipate that additional monitoring stations and frequency will need to be established for the PES scheme. Depending on the specifics of the scheme(s) parrot fish population monitoring may also need to be added.

Data/Results

There are no data or results yet on livelihood or conservation benefits to demonstrate the advantages/disadvantages of bundling/stacking. As described earlier, there can be potential conflicts between the native islanders (also the poorer, but not necessarily the poorest, residents on the island) and the tourism sector (mainly consisting of Colombians from the mainland). One possible management activity for protecting beaches (and biodiversity) is to stop the fishing of parrot fish, a key species for maintaining coral reef health and for sand production. The fishermen (made up of native islanders) are catching parrot fish for their own consumption as well as for sale to the hotels and restaurants for their guests. Similarly, other reef and seagrass management activities may impact the ability of the native islanders, especially the fishermen, to continue to pursue their traditions and livelihood activities. PES schemes may further increase these tensions if access to resources and alternative livelihoods

are not considered. Bundling and stacking, if it further restricts access, may enhance the potential for increased tension.

Summary and Outstanding Questions

As this PES scheme is still in the development and design stage, there is potential to explore bundling and stacking. However, given the level of stakeholder understanding and acceptance, stacking of market-like PES schemes is unlikely. A bundled scheme would be desirable given the interconnectedness of the land, coastal, and marine ecosystems, but no such buyer has been identified yet at present. The most likely mix of financing through PES will be a pilot PES scheme with the hotel sector stacked with the PES-like mechanism of tourist and operator fees and the potential for IPES through the Seaflower Trust Fund.

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List of Acronyms

CHICOP: Chumbe Island Coral Park Ltd.
CORALINA: Corporation for the Sustainable Development of the Archipelago of San Andres, Old Providence, and Santa Catalina – local environment authority
IMP: Integrated Management Plan (for the Seaflower MPA)
IPES: International PES
MPA: Marine Protected Area
PES: Payment for ecosystem services

Stacking and Bundling to Pay for Conservation of Multiple Ecosystem Services s in the Northern Plains of Cambodia

Prepared by Tom Clements, Carter Ingram and David Wilkie of the Wildlife Conservation Society

Introduction

Cambodia is of global conservation importance, as it falls within the Indo–Burma biodiversity hotspot, contains four of the Global 200 Ecoregions, and hosts the largest remaining tracts of ecosystems and species that previously spread across much of Indochina and Thailand. In contrast to its biological wealth, Cambodia is one of the world's poorest and least developed countries. Though reconciling conservation of biodiversity with activities that can help reduce poverty in rural areas is a major challenge,payments for ecosystem services (PES) offers a way forward.

Over the last decade WCS and our partners have launched three PES projects that stack and bundle different ecosystem services for sale in local and international markets. These projects are located in the Northern Plains of Cambodia, one of the three economically poorest, yet most biologically diverse provinces of the country. Giant and White Shouldered Ibis, two of the rarest birds in the world, are found in this area. Hunting and habitat destruction are the major threats to endangered species and ecosystems across the Northern Plains.

In response to these threats and to complement protected area (PA) management, the Ministry of Environment and Ministry of Agriculture, Forestry and Fisheries, with the support of the Wildlife Conservation Society (WCS), an international Non-Governmental Organization (NGO), instituted a series of pilot payment for ecosystem service (PES) programs. Three different programs were initiated in the same villages within two PAs in the Northern Plains landscape: the Kulen Promtep Wildlife Sanctuary (4,025 km^2), which was established in 1993 and is managed by the Ministry of Environment; and the Preah Vihear Protected Forest (1900 km^2), which was established in 2002 and is managed by the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries. Both PAs contain or are used by long-established communities whose livelihoods are based upon either lowland rain-fed paddy rice cultivation or upland shifting cultivation for rice and other crops, collection of forest products and fishing.

Main actors

- Local people
- The Royal Government of Cambodia
- International Bird-Watchers
- Hotels and Restaurants in Cambodia

Description of the Three PES Programs with an Emphasis on Stacking and Bundling
Stacking is being implemented through the establishment of three different PES programs on spatially overlapping areas and bundling has been implemented in one of the PES programs through specialty certification. The three payment schemes involve compensating villagers for adopting different sets of activities and/or management practices, that collectively help conserve rare species by addressing multiple threats affecting them and their habitat.

The first PES program to be established in this area involves direct, conditional payments for protection of nesting Globally Threatened bird species, which was initiated in 2002. Under the program, local people are offered a reward of up to US$5 for reporting nests and, an opportunity to be employed to monitor and protect the birds until the chicks successfully fledge. Protectors receive $1/day for nest monitoring, and an extra $1/day worked if the chicks successfully fledge. If the chicks do not fledge, the full payment is still given to the protector if it can be verified that nests failed due to natural causes, such as predation. The total payment of $2/day was deemed to be an acceptable daily wage based on initial village consultations (payments were raised to $2.5/day from 2008 in response to increasing local wages and food prices).. The protection teams are regularly visited every 1–2 weeks by village rangers employed by WCS and by WCS monitoring staff to check on the status of the nests and to compile nest protection data. The program operates year-round, as some species nest in the dry season and others during the wet season.

The second PES project began in 2004 in the village of Tmatboey in the Kulen Promtep Wildlife Sanctuary and focuses on tourism focused on two Critically Endangered bird species – the Giant and White-shouldered Ibises. In this PES scheme the agreement between the PA authorities, WCS, and the village, stipulates, explicitly, that tourism revenue will go the village as long as the villagers do not hunt key bird species and comply with an agreed upon land-use plan. The conditionality of tourism payments is further reinforced by fees that are paid by all tourists visiting: each birder pays $30 they see all targeted bird species, including the rare Ibis species, and $15 if only a subset of species are observed.

The third PES project is based on certification of sustainably produced rice. Under the program, farmers in the participating villages who keep to an agreed land-use plan and comply with no-hunting rules are able to sell their rice to a locally run marketing association. The association offers preferential prices to the farmers, because it by-passes middlemen who previously monopolized village trade in rice. The association directly sells the rice to national market centers and gets a premium price for rice that it is sold to tourist hotels and restaurants. “Ibis Rice” is certified as ”Wildlife- Friendly” brand, a new global certification system that tells consumers wildlife friendly practices have been employed throughout the production process. Payments to individual farmers are conditional on their compliance with the land-use plan and no-hunting rules, which is monitored by a village committee and externally verified by the marketing association. The prices were set based on the market premium available for rice, not based on an assessment of the opportunity costs to farmers associated with not further expanding their agricultural areas. In this case, Ibis Rice is sold as a bundle of two ecosystem

services (i.e., rice as a provisioning service and biodiversity) into a single product that garners a higher price, from consumers concerned about conservation, than rice sold without the Wildlife Friendly brand.

Rationale for Bundling and/or Stacking

Stacking is being implemented across the Northern Plains landscape because several different PES mechanisms were necessary to effectively reduce the multiple threats driving the decline of endangered species. The bird nest protection program was implemented first to decrease the severe threat to rare birds posed by the collection of nests for eggs and chicks, some of which can fetch prices of US$100 in national and international wildlife trade markets. However, the bird-nest scheme does not directly target habitat protection as the bird nest protectors are not charged with nor capable of also protecting breeding sites or feeding areas from other villagers or outsiders. Furthermore, villages with only the bird nest payments, but no ecotourism or agri-environment payments, have little incentive to protest the influx of in-migrants who contribute to deforestation and habitat loss. For example, in 2008 the nesting trees of one of only two South-East Asian colonies used by Greater Adjutant were cleared by in-migrants. For these reasons, it was necessary to stack this scheme with other schemes that directly provide incentives to decrease habitat loss and hunting of adults, the latter of which was also not stemmed by the bird nest program. The bird-tourism PES scheme has been extremely effective at decreasing land clearance and hunting threats to adult birds, however, tourism has limited potential for replication throughout the area because all of the villages support a similar species mix and the size of the international bird-watching market is limited. For this reason, the sales of Wildlife Friendly – Ibis Rice was promoted in 2008 as an additional community-based payment scheme that could be replicated more widely and could also provide an incentive to reduce habitat loss affecting species. Stacking different schemes helps address a range of threats that a single product/scheme may not. Stacking, like "not putting all of your eggs in one basket", is also a hedge against economic or ecological shocks. For example, if tourism were to decline for any reason, villagers, through the nest payments and Ibis Rice schemes would still have an incentive to comply with their land-use management plans and no hunting rules. Bundling biodiversity values into an agricultural product allowed farmers to sell their "Wildlife Friendly" certified rice in a niche market (i.e., to conservation concerned tourists in pricey hotels) and thus receive a premium price.

Major Challenges, Enabling Conditions, and Barriers to Bundling versus Stacking

The major challenges in this program were less related to stacking and bundling issues and more related to establishing PES in the context of common pool resources and weak institutions and governance structures. As addressing multiple threats to endangered species is a major focus of WCS's work, establishment of these schemes was a core part of the WCS/Cambodia program's mission, which kept entry and transactions costs low for participating villagers and farmers because a high percentage of the start-up costs were embedded within WCS project budgets. That said, developing multiple PES schemes in remote contexts with little pre-exising capacity for collective action and enterprise management, requires significant time and investment in training, and mentoring. In the case of the bird tourism, opportunity costs for participating villages were kept low because the birds are worth

more to tourists than they are when sold in local markets. Similarly, in the Ibis Rice scheme opportunity costs were low because most farmers were already farming rice, the market association provided free technical support on Wildlife Friendly practices, and the higher price obtained by selling certified rice was likely higher than the value of illegal hunting.

Monitoring and Tracking of Results

Bird Nest Protection:

The bird nest program has been extremely successful at protecting nesting sites, safeguarding over 2,700 nests of globally threatened or near-threatened species since 2002, including 416 nests in 2007–2008. Very few protected nests have been collected by hunters, although it is not uncommon to find unprotected nests that have been collected. The numbers of nests monitored and protected has increased by 36% on average each year since 2004. Most of the observed increase in nests has been associated with the Sarus Crane, Vultures, Oriental Darter and Lesser Adjutant, suggesting that persecution and nest collection were the main factors limiting populations of these species.

The amounts paid to nest protectors can be as high as US $400/individual/year, which is substantial compared to other cash income options. At a broader scale, payments average $1100–$1500 per village, depending on the year, but some villages earn considerably more due to the presence of a large number of key species, or species with particularly long breeding periods. For example, one of the participating villages made nearly $14,000 of payments over the four breeding seasons, mainly due to the presence of the Greater Adjutant colony which requires at least 6 months of protection each year. This example demonstrates why stacking can be important for generating revenue linked to conservation across a landscape: ecosystem services will not always be evenly distributed and, so, different approaches will have varying degrees of importance in different areas.

Critically Endangered Bird-Tourism:

Ongoing ecological monitoring has revealed substantial increases in wildlife numbers seen at the first village site, Tmatboey, and detailed records of the revenue coming in from tourism has allowed the project to monitor the social and ecological benefits of the enterprise. The population of White-shouldered Ibis increased from one nest and a single pair in 2002 to at least six nests and 23 individuals in August 2008. In addition, local people have begun to enforce the land-use plan regulations by refusing to accept in-migrants and controlling where new forest is cleared. Tourism numbers at Tmatboey have increased by an average of 36% annually since 2005 and revenue increased by an average of 100%/year over the same period, as the villagers improved service quality, allowing them to raise prices, and diversified the range of services provided so that they capture a greater proportion of the value chain. The average per tourist payment for services increased from $10 in 2004 to $67 in 2008 and the percentage of tourism spending accrued locally has risen from 11% to 24%.

Wildlife Friendly Rice:

WCS has developed an effective monitoring system that involves field audits and satellite analyses to ensure compliance with land use contracts, annual assessment of key bird

populations using counts of breeding pairs, and livelihood monitoring to track levels of family wealth. Community members are integrated into the monitoring system.

The monitoring results show that the project has been successful at increasing income and reducing land clearance. In 2008, the initial 78 farmers participating in the program each received more than $60 in additional income for their produce, which is a significant amount in a village where average annual incomes are less than $400 per year. Since then, communities have tripled the proportion of revenue that they receive from Wildlife Friendly production. Given this success, the program has been expanding from two villages in 2008 to ten additional villages (>10,000 people). The project also provides other benefits to community members, such as training and access to credit at reduced interest rates. Lastly, the negotiation of land-use boundaries as part of the project allows farmers to become eligible for formal land titles for their plots strengthening existing tenure arrangements that support conservation and enhance land rights of local people.

Summary

Stacking and bundling of PES projects have benefitted both the ecosystem and the communities of the Northern Plains. Stacking of PES projects has created several different incentives for enhancing an ecosystem service - biodiversity - that is of interest to two primary buyers active on the landscape: the international conservation community and the international bird watching community. In addition, bundling wildlife values into rice production has added a higher value to this provisioning service that already served as an important source of income to local communities. Although the programs overlap with each other spatially, each program involved different management practices that were employed and compensated at the individual (farmers and bird-nest guardians) and village (bird tourism) scales, so double counting has not been an issue as it is with many stacked credit programs. Through stacking, three different incentives have been created to protect rare bird species, which have helped decrease the multiple threats affecting them. In addition, by diversifying the markets being accessed by these PES schemes, tourism and specialty certified rice, a degree of resilience to economic shocks may have been added to the system effectively insuring the incentive payments against market fluctuations. In addition, the PES programs have created new significant sources of revenue for the communities, in the case of tourism and bird-nest protection, and have added value to a pre-existent stream of revenue, in the case of rice production.

This case study was informed by work undertaken by the WCS Cambodia Program and has been documented in depth in:

Clements, T., John, A., Nielsen, K., Chea, V., Ear, S., Meas, P., 2008. Tmatboey Communitybased Ecotourism Project, Cambodia. Wildlife Conservation Society, New York.

Clements, T.J., Garret, L., Kong, K.S., Pech, B., Rainey, H., Rours, V., Tan, S., Thong, S., 2009. Bird Nest Protection Program in the Northern Plains of Cambodia. Wildlife

Conservation Society, Phnom Penh and New York

Clements, T., John, A., Nielsen, K., An, D., Tan, S., & Milner-Gulland, E. J. (2010). Payments for biodiversity conservation in the context of weak institutions: Comparison of three programs from Cambodia. *Ecological Economics, 69*(6), 1283-1291. doi: 10.1016/j.ecolecon.2009.11.010