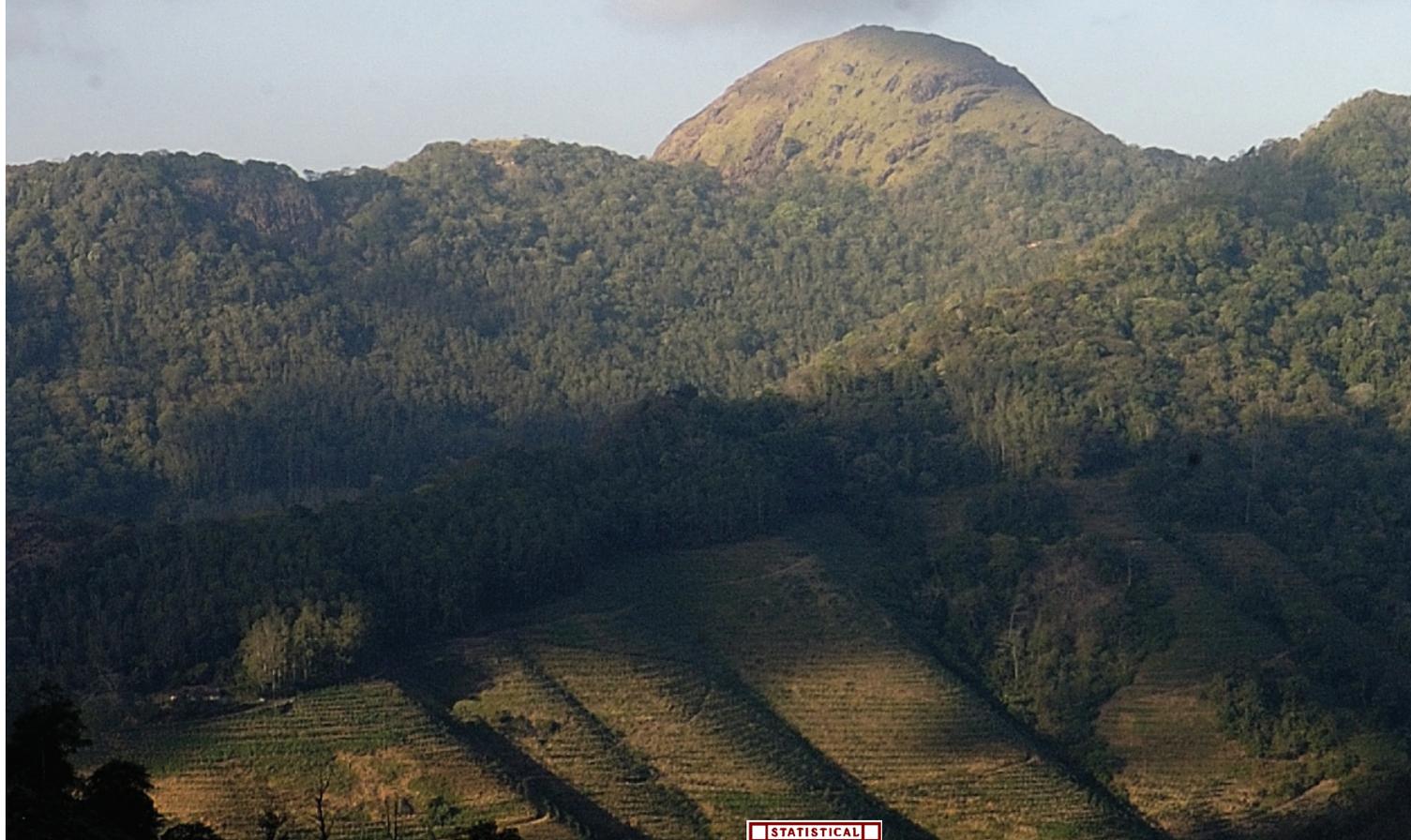


# ECONOMIC INCENTIVES TO FOSTER CONSERVATION



# Economic Incentives To Foster Conservation





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# 1. INTRODUCTION

Over the last two centuries, there has been a tremendous change in tropical forest cover world over, due to human use and activities such as large scale logging, conversion of forests to plantations, construction of reservoirs, roads and expansion of human settlements, and a larger ecological footprint of a rapidly growing consumptive economy. The resulting fragmentation and degradation of tropical forests is a major threat to biodiversity (Laurance and Bierregaard, 1997) especially habitat specialists and endemics (Laurance, 1991; Umapathy and Kumar, 2000). This has not only resulted loss of biodiversity but also in the degradation and erosion of ecosystem services. Ecosystem services can be broadly defined as services rendered by nature which are vital for mankind's survival such as, soil protection, biogeochemical cycles, climate regulation, hydrological cycles, etc. Although biodiversity may not play the most significant role in ecosystem services, it plays two crucial roles and they are: it provides an ecosystem its functional attributes and it renders stability to and supports ecosystem resilience (Norman Myers 1996). Empirical evidence also points out the significance of underlying functional diversity in maintaining ecosystems (Tilman et al. 1997).

In India only small remnants of biodiversity rich and diverse ecosystems remain intact today within a few Protected Areas (PA). Currently many protected wildlife reserves in India, including those known for their large mammals, have resident settlements of tribals and/or other communities. In addition, a large number of human settlements about these fragmented forested landscapes exerting severe pressure on forest resources. This large group of people (nearly 50 million) living in and around protected areas (Kutty and Kothari 2001, Rodgers et al. 2003) is highly dependent on the surrounding forests to meet their biomass needs (fuel wood, fodder, timber, meat and other forest produce). This dependency in many cases has led to habitat degradation (Gadgil and Guha 1992, Kothari et al. 1995) and reduced regeneration potential as well as changes in forest structure and composition due to long term use (Murali et al. 1996, Shankar et al. 1998, Somanathan and Borges 2000).

Human-wildlife conflicts because of the proximity of human settlements have resulted in substantial economic loss to these communities from crop-raiding and loss of livestock. In turn, retaliatory poisoning of livestock kills has led to higher mortality of predators (Madhusudan and Karanth 2002, Madhusudan 2003, Madhusudan and Mishra 2003, Treves and Karanth 2003, Madhusudan 2004). Impact of frequent anthropogenic forest fires are less documented, but studies indicate stunted growth of juvenile trees in frequently burnt areas (Saha and Howe 2006) and reduced diversity, increased dominance of a few trees and large-scale invasion by exotics (Saha and Howe 2003, Hiremath and Sundaram 2005). A recent study on impacts of grazing indicates that there may be competition for pastures between livestock and wild herbivores given the coincidence of diet choice (Bagchi et al. 2004).

Past efforts to sustain healthy wildlife populations have been severely hampered by the exclusionist policies that provide no scope for people living in biodiversity rich landscape to benefit from conservation efforts. Pre- and post-independence forest management practices in India have been mostly guided by national-level policies (Bhat et al, 2001), and the focus was mostly to extract commercial timber. Continued forest loss set off a crisis in the 80s and various plantation programs were implemented to increase forest cover, although most resulted in failure (Pandey, 1992). Around the same time forest policy was revised and priority given to conservation of forests and biodiversity rather than financial benefits from forests, acknowledging the need for community participation in the co-management of degraded forest. This shift in policy led to implementation of subsidy and incentive based participatory management programs such as Joint Forest Management (JFM) and Village Eco-development (VED), the World Bank funded India Eco-development Project (IEDP).

The above mentioned programs have been implemented with limited success in the Western Ghats, a chain of forested mountains along the western coast of India. This mountain ecosystem with its precipitation gradients

has a significant influence on the regional climate, hydrology and distribution of vegetation types (Pascal, 1988). The Western Ghats is globally recognized as one of the 8 hottest biodiversity hotspots in the world (Myers et al. 2000). The region south of the Palghat gap is especially known for high endemism of flora and fauna (Pascal, 1988; Ramesh et al. 1997). A total of 58 protected areas represent only 9% percent of the Ghats and vast stretches of this landscape lies outside formal protection. Landscape level prioritization (Das et al 2006) shows significant prioritised areas lie under Reserve Forests and can be incorporated into a wider network of conservation areas. However, expansion of the Protected Area network is very expensive in human dominated landscapes as it would incur huge costs to displace a large number of people in a socially and economically just manner. Avoiding major ecosystem losses therefore requires protection in cooperation with local residents outside the Protected Area network and new measures, based on sound science, be adopted to conserve remnant forest patches and restore connectivity between them.

Pervious efforts to involve communities and people living on forest fringes in conservation efforts have had limited success, thus warranting a new perspective. A Payment for Ecosystem services (PES) approach is an innovative mechanism that involves economic incentives for a stakeholder, e.g a landholder or a community, to adopt ways to conserve biodiversity or restore an ecosystem on his property. It is a market-based mechanism to secure conservation outcomes. Payments are monetary or in-kind and are given as compensation for future costs that the landowners or community may incur in their efforts to “protect / restore” an ecological good or service. These payments are mostly contingent upon measurable outcomes and at times on specific action and the payment amount depends on the conservation value of a site. Arriving at the true conservation value is a hurdle. As this is complex and often difficult, use of auctions for conservation contracts can effectively reveal this cost.

Executing PES involves costs for the conservation agency as well as the landholders. In their endeavour to conserve, landholders incur costs such as additional

labour costs, or decrease in profits when they switch to conservation friendly practices. Conservation agencies need to allocate payments prudently as they have to work within a limited budget. Hence accurate estimation of costs involved especially the landowners’ “willingness to accept” a conservation contract (the minimum amount required for contract activities), is crucial to designing payment schemes. In other words the cost-effectiveness of PES approach relies on reliable estimation of supply curve of ecosystem services obtained per rupee spent. Most often the landholders are privy to information regarding the costs they incur and do not have incentives to reveal true valuation of the costs involved. When using auctions for conservation contracts as a payment mechanism, truthful revelation of the costs incurred by the landholders is revealed by competitive bidding. Although there are many approaches that incorporate costs into design of payments, they mostly incorporate profit/loss costs. They do not take into account hidden costs such as risk and time preferences, option values, subjective beliefs, etc.

In the subsequent sections we summarize published scientific papers and reports which address the issue of estimating true conservation costs. We introduce some key concepts that need to be considered before initiating or designing conservation contracts with individual landowners and also provide examples where payment mechanisms have been used to change landuse and land management practices. Although the model addresses issues of working with individual landowners the same can be modified to work with communities. Developing incentive based mechanisms to work with local individuals and communities to mitigate anthropogenic ecosystem threats is more demanding and innovative; we are convinced, however, that the elements that can make such an approach work are already in place. Assuming that changes in landuse and land management practices can be put in place, there is a concern of increasing human wildlife conflicts when animals start using the restored landscape. We look at some possible solutions to resolve these conflicts. Lastly, we address the issue of making these payment mechanisms self sustaining in the long run and how properly designed eco-tourism and carbon markets can fund such conservation initiatives.

## 2. USE OF AUCTIONS FOR CONSERVATION CONTRACTS

Bardsley et al (2002) point out that managing ecological goods and services are in some respects similar to management of any capital asset. Biodiversity and environmental goods appear to be mostly like market/consumer goods which are in fixed or limited supply, but not adequately valued through the market system. It is generally acknowledged that existing markets are efficient in allocating resources to 'exploitation activities' but ineffective with respect to investment in environmental conservation. It is this incompleteness of markets that results in a distortion of resource allocation from the 'efficient', or value maximizing, outcome (Bardsley et al. 2002). Markets for environmental goods and services can be characterized as the interaction between government, on behalf of society, and individual agents in the economy. A market based approach amounts to tightening our understanding of the willingness-to-pay and the opportunity cost of landscape interventions that impact the environmental assets. The authors observe that public willingness to pay for environmental assets is greatly diminished by the informational asymmetries that are inherent in many environmental issues. It is for this reason that transparent and objective program evaluation is a key step in improving the management of the environmental landscape (Bardsley et al. 2002).

Citing the example of BushTender initiative of the Victoria government to protect native vegetation on private farms in Australia Stoneham et al. (2003) provide a detailed review of transaction costs and various factors that affect transaction costs. The authors also discuss about policy mechanisms widely used to

procure environmental goods. These mechanisms range from legislation to control the use of an environmental good to auctions for procuring a good by an agency or a government. The authors favor the use of auction particularly as a mechanism to reveal supply prices. In auctions, the landowners bid to supply environmental services. The conservation agency is able to obtain information about the relative costs of supply because in an auction the landholders are asked to bid for a price at which they are willing to supply these services. On the other hand, the landholders also obtain information about what activities have environmental value and what environmental service is a priority for the conservation agency. It acts as an information sharing mechanism which improves decision making by the agency (Stoneham et al. 2003). Eigenraam et al. (2008) present a variation of the BushTender model to linkup multiple outputs that can be marketed from change in land management practices.

Bardsley and Burfurd (2009) improvise on an existing procurement model and develop a mixed model, allowing for voluntary participation, multiple agents, risky production, adverse selection and moral hazard. They address the question whether one can design a common type of contract that can be used across a range of institutions (Government procurement, private procurement in an offset market and government, acting as an intermediary in the off-set market, procures off-sets and sells them on to developers), or whether contract design must be sensitive to the institutional framework.

## Transaction cost economics approach to consider environmental policy

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*August 2003.*

The following paper by Stoneham et al. (2003) discusses the scope of transaction cost economics in the context of designing public policy mechanisms. With a brief introduction to history of transaction cost economics, the authors provide a detailed review of various mechanisms and their relevance in formulating environmental policies.

Transaction costs economics underlie not only private sector transactions but also public policy transactions. Knowledge of these transaction costs helps in understanding contracts. There are two key assumptions of transaction cost economics that underlie contracts. They are a) bounded rationality – contracts need mechanisms to ensure protection to both the parties in the event of unforeseen circumstances b) opportunism – when initial terms of the contract change and one of the parties gains from the change. These assumptions indicate that contracts are incomplete and while designing contracts, mechanism to safeguard against any hazard need to be put in place. This is important in the case of contracts which are dynamic or ongoing e.g. contracts between conservation agency and the landholder for procurement of environmental services. In these contracts, both ex ante and ex post costs are considered by transaction cost economics. For contracts to be cost-effective, policy makers can make use of a design that reduce overall costs while still capturing the value of a contract. Over a period of time, contracts that economize replace cost-ineffective contracts.

In this paper, the authors also discuss basic concepts of efficient provision of a good, including an environmental good. There are two key factors in the provision of any good – demand and supply. Demand in the context of an environmental good represents the value placed by the society on that and represents the various benefits of an environmental good the society enjoys. Demand of a good falls if there is an increase in its quantity. In other words it is assumed that if a society has a good in excess, it values a small increment in it relatively less. Demand can also be termed as willingness to pay i.e. how much people are willing to pay for another unit of that good. Supply represents the cost of producing or providing that good. The cost depends on the mechanism used to supply the good. In other words, it represents the minimum cost of obtaining another unit of that good. When an environmental good is in excess, procuring few more units of the good will incur higher marginal costs. This reduces the benefits of the good relative to the costs of supplying it. Procuring a good over and above the supply and demand reduces the benefits of that good relative to the costs of supplying it. These concepts form the basis for most other topics covered in this paper.

The authors also address the issues regarding formation about demand for environmental goods and problems associated with incomplete and/ or asymmetric information. Often it is difficult for a conservation agency to obtain information about supply and demand (willingness to pay) for environmental goods. Most often it is difficult to define and estimate value of an environmental good but there are instances where economists have developed an index to estimate the value of an environmental good (see BushTender initiative in the following paragraphs). Common man could have total access to the information about the relative benefits of different goods and resources could be allocated according to people's fully informed preferences. However, there are transaction costs in obtaining and transferring information. Often there is inadequate information available and whatever information is available is accessible to some people in the society i.e. the problem of asymmetric information. Further transaction costs hamper information flow among all the players in a society. This is especially the case in the context of decentralization and centralization of decision making process. In the case of centralization, where all the decisions are taken by a principal (e.g. a government) but information has to be transferred back to the principal which involves transaction costs. As a tradeoff, the authors suggest that, at a very broad level concerning policies regarding multiple issues, it may be costly to decentralize. However, when local agents are equipped with information, decision making should be ideally decentralized.

The authors also discuss about policy mechanisms widely used to procure environmental goods. There are various mechanisms to procure environmental goods on private land. These mechanisms range from legislation to control the use of an environmental good to auctions for procuring a good by an agency or a government. The most efficient mechanism is the one which achieves desired level of outcome with least cost to the society. Ideally, an agency should use a mechanism or a combination of mechanisms which are cost-effective. Legislation is policy mechanism which can be used as regulatory approach, say for defining or modifying property rights or to specifying rules within which markets operate. Usually this mechanism is used a backdrop to other mechanisms. It is an appropriate tool that can be used to achieve conservation when it is crucial to conserve critically endangered ecosystems which face imminent danger and any further damage to them could result in irreversible losses. However, this mechanism may not be a viable option in obtaining proactive management from landholders as this leads to higher transaction costs of compliance and enforcement.

Another possible alternative is use of auctions. The authors favour the use of auction particularly as a mechanism to reveal supply prices due to competitive bidding. On the other hand, the landholders also obtain information about what activities have environmental value and what environmental service is a priority for the conservation agency. It acts as an information sharing mechanism which improves decision making by the agency.

Flat-rate taxes and subsidies are two policy tools which are employed by various governments world over for environmental conservation. Taxes are imposed on a landholder for every activity he undertakes on his land that is detrimental to environment. For example, tax may be imposed for every acre of forest cleared or each unit of fertilizer used. Subsidies work in a complementary way. Here the landholder receives a payment for every unit of output or input that is environmental friendly. For example, the landholder receives payment for every acre which is reserved for afforestation. In order for the conservation agency to reach its goal, it should ideally subsidize on outputs. However, in many instances the outputs are costly to measure. In this scenario, it may need to subsidize on inputs as a proxy to outputs. But the problem of subsidizing inputs is that there can be varying amounts of inputs for each output. This leads to uncertain impacts on outputs unless there is constant transformation from inputs to outputs. The authors discuss advantages of using auctions over subsidies. In the case of subsidies, the prices of inputs are specified beforehand. This is an issue since most often it is difficult to predict outcomes for the specified price of the input. This makes the budgetary costs also ambiguous. Additionally, in auctions, the agency can obtain information on the landholder's costs. This information is important as it helps the agency to judge the efficiency of the scheme. Further, the agency could select bids based on the services that are provided. Subsidies may be viable only in the case where outputs can be measured at a relatively low cost. Although subsidies are administratively simpler, most often there is no subsequent monitoring. This raises the issues of accountability. If monitoring is incorporated into the scheme, then subsidies may no longer be administratively simple.

Land purchase is a viable option if it is cost-effective than other mechanisms. This depends on a lot of factors such as purchase price, cost of managing the land, and its biodiversity value. Cost-effectiveness of this mechanism also depends on the location of the sites. If a site is situated next to an existing reserve, then land management costs might be lower as the site could use existing management resources. On the contrary if a site to be purchased is an isolated patch and quite distant from any of the existing reserves then it is likely to incur higher management costs. The authors suggest that land purchase could also be incorporated into auctions. Here the bids are invited for a variety of contracts such

as short-term management, long-term management or even land purchase wherein the agency will take over subsequent management. The landholder can then decide what contract to choose and the agency could choose the bids depending on the supply price.

Offsets are very similar to legislation but it involves lower costs than legislation. They are implemented with the aim of holding or maintaining the quantity of a good constant. It requires a landholder who aims to reduce the stock of the good to fund an offset of exact amount that would be lost. For example, re-vegetation elsewhere or restoring degraded forest patches on the land. Carbon credits which are implemented by many developed countries are another example. In an ideal scenario an offset should improve efficiency as it allows remnants on the land that are highly valuable to the landholder to be exchanged with remnants that are relatively less valuable. At the same time an offset should equal the same amount of an environmental good from the agency's perspective. Hence it becomes imperative to maintain the quantity and quality of an environmental good with least cost to the holder. However, for an offset to be successfully implemented, the environmental good should be cost-effectively defined and offset otherwise it can lead to huge losses as a result of poor quality offset.

Ecolabelling refers to the use of labels that indicate attributes of a product that are difficult for the consumer to verify. For example, organic tea. But this mechanism faces the problem of asymmetric information. There is no way the consumer can discriminate between two companies claiming larger investments in conservation without further information. Another challenge that this mechanism faces is proving its claim to consumer satisfaction. Ecolabels will persist in the market so long as costs of proving claims remain less than the benefits from the label.

The authors also discuss the importance of dynamic efficiency which refers to efficient use of resources over a period of time as against static efficiency which is efficient use at a single point of time. In order to achieve dynamic efficiency, the agency may need to invest in mechanisms which although not the most efficient in one period but may decrease future transaction costs. Just as the aims and mechanisms for procuring environmental goods are important, the agency needs to consider the issue of institutional structure where these mechanisms are designed and implemented. The authors discuss this issue within the purview of transaction cost theory. Mechanisms can be implemented at level of a centre which then allocate resources to different regions depending on its aims. Alternatively, mechanisms can also be designed by regional agencies which then get funds from the centre to implement and allocate resources according to their conservation aims. In the second case, if the regional agency implements policies that benefits the region whereas the centre aims at

conservation at a larger geographical scale, this leads to a conflict between the centre and the regions. This raises the transaction costs substantially. However, if the funding is from a local body, it reduces the transaction costs to have regional institution to implement and

allocate resources. This report provides a useful framework of analysis for policy makers as it covers a whole range of topics from allocation of property rights to institutional design.

## Selecting policy mechanisms for biodiversity conservation on private land

Gary Stoneham , Vivek Chaudhri and Loris Strappazon

*Proceedings of the Conference on Land Use Change, 2003*

### ABSTRACT

The objective of biodiversity conservation policies is to achieve the level of biodiversity conservation that meets the needs of society. Using a transaction costs approach, it has been possible to establish the core elements of a biodiversity policy portfolio. Legislation is a key component of this portfolio. Its objective is to protect the core values of society, in this case to preserve a threshold stock of biodiversity. Other elements of an optimal policy portfolio need to be determined on the basis of supply prices. The optimum mix of management agreements on private land, land purchase, voluntary schemes, etc. is best determined according to which achieves the greatest increase in biodiversity per dollar

of expenditure. There appears to be little scope for the use of taxes, fixed price subsidies and tradeable permits for terrestrial biodiversity conservation because of non-standard benefits and poor property rights specification. If policies are designed to reveal the supply price of additional units of biodiversity, it is possible to add eco-labelling and offset schemes to the policy mix. These mechanisms can reduce the funding burden of government and create wealth in the economy. Finally, education and information leading to attitude change will always be an important component of the environmental policy portfolio.

## New directions in environmental policy

Peter Bardsley, Vivek Chaudhri, Gary Stoneham and Loris Strappazon

*Agenda, Vol. 9(3): 211-221. 2002.*

Governments around the world are wrestling with issues associated with the use and degradation of natural resources and the environment and allocate significant resources for their management. Although there is general acknowledgment that these programs have altered community awareness about environmental issues, there is very little information on how these programs have cost-effectively achieved significant on-ground outcomes. In the case of environmental policy, the uninformed party has overwhelmingly been the general public. This lack of information has left the public with little confidence in the policy agenda.

The authors delineate the nature and existence of an 'environmental problem'. Second, a discussion of the existing policy approaches is undertaken. The third section of the paper, on a new policy framework, necessitates an investigation of the role of markets

in the environmental landscape. Finally, the authors conclude with some observations on the importance of future research, both in terms of policy mechanisms and institutional design. At a macro level, economic growth and population growth lead to an increase in demand for most resources. Furthermore, environmental goods appear to be mostly like market/consumer goods which are in fixed or limited supply, but not adequately valued through the market system. Further complexity arises when environmental resources often yield multiple outputs, some of which are valued by the market while others are not. It is generally acknowledged that existing markets are inefficient in allocating resources to environmental conservation. It is this incompleteness of markets that results in a distortion of resource allocation from the 'efficient', or value maximizing, outcome. The result is a squeeze on environmental resources.

Current environmental management policies suffer from three specific problems. Firstly, there is insufficient information on which to make reasonable choices, and there is often an implicit assumption that there are standard benefits from intervention across the landscape. Secondly, policy directives have often failed to take into account the incentives of individual agents and the way that policy influences behaviour. Finally, the absence of ex-post measurement and accountability processes has limited policy learning and evolution. What is often missing from current environmental policy mechanisms is a well-developed schematic for understanding and measuring or estimating the multiple attributes of environmental assets. From a societal perspective what is required from policy makers is a methodology for revealing site-specific information about the trade offs associated with using natural resources and their impact on the environmental landscape.

Managing the environmental landscape and its implications for policy are in some respects similar to management of any capital asset. Markets for environmental goods and services can be characterized as the interaction between government, on behalf of society, and individual agents in the economy. A market based approach amounts to tightening our understanding of the willingness-to-pay and the opportunity cost of landscape interventions that impact on the environmental assets. A new coherent policy framework must begin with a diagnosis of environmental problems as economic problems. Further, a clear delineation of the feasible policy objectives, which are gleaned from scientific research and market information, needs to be coupled with the design requirements of potential implementation methods.

In redesigning the environmental policy framework the authors suggest recourse to scientific and economic theory to potentially push out the boundary between the marketed and non-marketed parts of environmental goods. When dealing with environmental goods, the direct effect of the market is the ability to procure at least cost. An important indirect effect of this process is behaviour change that occurs from involvement in the market itself. That is, price signals in a market for biodiversity conservation yield not just conservation at least cost, but an awareness of previously unpriced environmental assets that may impact behaviour in other parts of the environmental landscape. Similarly, on the demand side, the market process forces a reallocation of conservation efforts to where the value is the greatest. A further benefit of markets in environmental goods is the possibility of cooperation and teamwork between different programs and the recognition of the opportunity costs of pursuing one program over another.

Finally, from the information revelation perspective, the full social value of environmental resources becomes evident through the market process, as well as the costs of enhancing them. This is a valuable input into policy design. The authors observe that public willingness to pay for environmental assets is greatly diminished by the informational asymmetries that are inherent in many environmental issues. It is for this reason that transparent and objective program evaluation is a key step in improving the management of the environmental landscape.

## Contract Design for Biodiversity Procurement

Peter Bardsley and Ingrid Burfurd

*Research paper no. 1031. Department of Economics. The University of Melbourne. January, 2008.*

### ABSTRACT

Market based instruments are proving effective in biodiversity procurement and in the management of regulatory schemes to preserve biodiversity. The design of these schemes brings together issues in auction design, contract theory, ecology, and monitoring. Using

a mixed adverse selection, moral hazard procurement model, we show that optimal contract design may differ significantly between procurement and regulatory policy environments.

### 3. INCENTIVES FOR CHANGING LANDUSE AND LAND MANAGEMENT PRACTICES

Auctions are an interesting mechanism to obtain conservation contracts as against fixed-price or uniform subsidy which many EU countries adopt as a scheme to promote biodiversity conservation. Auctioning of conservation contracts have been implemented in many countries. They have been used to tackle several issues regarding conservation on private lands such as soil erosion control, afforestation, etc. Auctions are mainly used to procure goods that have no well established markets. In the context of conservation, the item being traded such as biodiversity is a public-type, non-market good which has no standard value. Here, the roles of the bidder and the auctioneer differ from their counterparts in a conventional auction setting. The bidder now offers to change their land use for a certain minimum amount they require as compensation and the auctioneer aims to minimize the amount spent or maximize the conservation value of a contract within a specified budget in order to reach a conservation goal.

Rouseau and Moons (2006) discuss various theoretical aspects of using auctions in the context of conservation contracts. They delineate eight crucial aspects of designing and implementing auctions. The authors site a pilot study for an afforestation project implemented by the Belgian government wherein they compare use of auctions with the existing command-and-control policy in order to demonstrate the potential of auctions. Under this scheme the farmers were given subsidies to convert part of their agricultural land to natural forests. The authors suggest that in a democratic set up, implementing dictatorial approach of forcing farmers to convert agricultural lands to forests may not be a viable solution. They then used a discriminatory first-price sealed-bid auction wherein the farmers could ask for the payment they would like receive for conversion of farmland to forest. They demonstrate that auction scheme is better than the existing command-and-control scheme in terms of better gains and also better social welfare.

Jack et al. (2008) conducted a pilot auction as a part of the PES project in Sumatra wherein coffee growers bid for contracts for soil erosion control. The auction took place in Sumberjaya subdistrict where coffee plantations were situated in erosion-prone area in the highlands and soil erosion potentially contributed to siltation in downstream areas endangering sensitive aquatic ecosystems. The authors use procurement auction as a mechanism to obtain information about costs. The contracts given for measurable activities rather outcomes while ensuring there was no decrease in coffee production. The authors measured performance based on these activities rather than outcomes because of monitoring difficulties. The authors use uniform-price rule for the auction in which the final contract payment equaled the lowest rejected-offer price. Under this rule, chances of losing a contract for a price closer to the Willingness To Accept (WTA) value were high if the bidders bid above their true WTA values and chances of winning of a contract for a price much lower than the true WTA value were high if the bidders bid below their true WTA value. The authors demonstrate the potential of their approach to overcome the problem of asymmetric information about costs involved during design phase of a PES scheme. This is also the first study to use a conservation auction in a developing country scenario.

In the state of Victoria, Australia, the government undertook a programme to conserve over three million hectares of native vegetation that were on privately owned land. These private holdings were of high conservation value and important for biodiversity, salinity control, water quality, land protection, greenhouse and landscape reasons. The Victorian Government supported this conservation programme called BushTender through public investment and a variety of incentive programmes.

BushTender demonstrated that an auction approach can be an effective way to invest public funds for biodiversity outcomes. This initiative has now become

part of the Department's state-wide approach towards native vegetation management. In order to implement the BushTender model an initial ecological assessment of all privately owned land was conducted by trained ecologists on behalf of the government. This helped in developing a Biodiversity Significance Score (BSS) for each parcel of land. The BSS incorporates landscape preference, species conservation status and vegetation type.

A list of habitat improvement services was also identified. The range of services include: retaining large trees; fencing area to exclude livestock; retain fallen timber; control pest and weeds and supplementary planting of key species. Sealed tenders were invited from private land owners in an auction where each owner states proposed habitat improvement services and an associated price for providing these services.

In order to rank these tenders an index called the Biodiversity Benefits Index (BBI) was developed. The BBI takes into account the Biodiversity Significance (BSS) of the proposed land and the Habitat Service (HSS) offered by the owner and the cost for providing this service. Tenders with the best value for money were accepted till the budget for that year was spent. In subsequent years the model was able to incorporate data from previous year's bids to help determine the most cost effective bids. One important method to ensure auctions are cost effective was establishing 'reserve pricing', where each biodiversity outcome has a maximum price fixed by the department. This allows the government to transfer funds from auctions if proposals in the current auction exceed the reserve price. BushTender agreements showed a high acceptance rate

where 96% of the landowners signed the contracts. This remarkable conservation initiative demonstrated that public investment in biodiversity improvement can work through a system of auctioning.

Stoneham et al (2001) develop a model that combines point-source emitters (PSE) of waste, with landholders that can provide pollution-offset activities and provide a review key elements of tradable emission permits and auctions for land management, and mechanisms in which these can operate together. In a scenario where such a system is operational along with land management auctions with farmers then the reduction in pollution, which is a by-product of the auction may be valuable to PSEs. If the units of pollution reduction, or mitigation, can be turned into saleable goods, then PSEs may benefit. A well-designed auction can reveal the minimum remuneration required by different landholders to provide land management. The permit-plus-auction system reduces price of pollution credits and firms gain for three reasons: they pay less for the permits they already hold; they replace relatively costly abatement with mitigation units; and they expand output. This system of permit-plus-auction scheme is not viable if the per unit transaction cost is greater than the marginal cost of abatement for each PSE. If the main thrust of land management is to purchase public goods, then the auction could be seen as a mechanism for cost sharing. Shifting their cost to PSEs in this model may be deemed beneficial by the agency from a budgetary perspective. The authors demonstrate that there is potentially an economic-surplus gain from combining landholder mitigation and a tradable permit system, given that transaction costs can be kept relatively low.

## **Auctioning Conservation Contracts: An Application to the Flemish Afforestation Policy**

**Sandra Rousseau and Ellen Moons**

*Working paper series no. 2006-06: Energy, Transport and Environment – Centre for Economic Studies, Katholieke Universiteit Leuven. March 2006.*

### **ABSTRACT**

**T**his paper studies the possibility of using auctions as a policy instrument in conservation programs. In particular, it provides insight into the main concerns that need to be dealt with when implementing conservation

auctions. To show the cost saving potential of this policy instrument, we also calculate the social welfare improvement that can be obtained for an afforestation project in Flanders.

## **A Revealed Preference Approach to Estimating Supply Curves for Ecosystem Services: Use of Auctions to Set Payments for Soil Erosion Control in Indonesia**

**B. Kelsey Jack, Beria Leimona, and Paul J. Ferraro**  
*Conservation Biology, Vol. 23 (2): 359–367. 2008.*

### ABSTRACT

To supply ecosystem services, private landholders incur costs. Knowledge of these costs is critical for the design of conservation-payment programs. Estimating these costs accurately is difficult because the minimum acceptable payment to a potential supplier is private information. We describe how an auction of payment contracts can be designed to elicit this information during the design phase of a conservation-payment program. With an estimate of the ecosystem-service supply curve from a pilot auction, conservation planners can explore the financial, ecological, and socioeconomic consequences of alternative scaled-up programs. We demonstrate the potential of our

approach in Indonesia, where soil erosion on coffee farms generates downstream ecological and economic costs. Bid data from a small-scale, uniform-price auction for soil conservation contracts allowed estimates of the costs of a scaled-up program, the gain from integrating biophysical and economic data to target contracts, and the trade-offs between poverty alleviation and supply of ecosystem services. Our study illustrates an auction-based approach to revealing private information about the costs of supplying ecosystem services. Such information can improve the design of programs devised to protect and enhance ecosystem services.

## **BushTender : Rethinking investment for native vegetation outcomes. The application of auctions for securing private land management agreements.**

**Michael Crowe, James Todd, David Parkes, Sheri Burmeister, Gary Stoneham, Loris Strappazon and Anne Buchan.**

*Department of Sustainability and Environment. of Victoria, Department of Sustainability and Environment, East Melbourne. 2008*

### EXECUTIVE SUMMARY

Victoria's Native Vegetation Management Framework (NRE 2002) sets a primary goal to achieve a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a net gain. Achieving this goal will make a significant contribution to positive outcomes for biodiversity, land and water quality and climate change. The Framework recognises that almost \$15 million of State and Commonwealth funds are invested directly within Victoria each year on native vegetation protection and revegetation programs and this contribution is more than matched by on-ground work by community groups and individuals. As an initiative to improve public investment in private land native vegetation, Victoria's draft Native Vegetation Management Framework (NRE 2000) included a commitment to undertake a trial program, in which formal contractual arrangements regarding the management of native vegetation on private land were to be entered into between the landholder and the Government. This report documents the application of auctions for securing private land management agreements for native vegetation, with a

case study of the BushTender trial auction. The report also discusses aligning biodiversity outcomes with priorities, better engagement, building partnerships, the cost-effectiveness of BushTender, future investment through BushTender and the further development of auctions for public investment. Auctions are a mechanism that can reveal hidden information (i.e. information important for decision makers that was previously not known or shared) so that better investment decisions can be made. They require landholders to reveal their information on preferred actions and associated costs and the government to reveal its preferences for biodiversity assets and actions. The scoring mechanism can be designed to accommodate the variable benefits from site to site. In BushTender, landholders establish their own price for the management services they are prepared to offer to better protect and improve their native vegetation. This price is submitted as their bid, which is compared with the bids from all other participating landholders. Successful bids are those that offer the best value for money. Successful landholders receive periodic payments for their

services under management agreements signed with the Department of Sustainability and Environment. Under the management agreements landholders report each year on their vegetation management activities and their progress towards the agreed objectives. Landholders are involved in the development of the management plan, which leads to agreement on actions that are set at a level the landholder is comfortable in implementing. The agreements are easy to understand and specify actions which the landholder needs to carry out at different times of the year. The flexible approach of BushTender, allowing landholders to choose their commitments and management actions, results in a high rate of acceptance of management agreements offered. BushTender provides a streamlined process for the investment of public funds. It maximises the opportunity of the site visit to engage the landholder in

biodiversity conservation and to collect valuable data. These data not only provide the basis for ranking bids in the auction evaluation, but contribute to improving the current knowledge on rare and threatened species, pest plants and animals and vegetation type and condition across the target areas. This comprehensive information enables better investment decisions to be made and a record of where, when, and for what outcome funds have been invested. While the BushTender trial focused on biodiversity conservation, the approach is flexible, and the index used to differentiate between different landholder proposals can be adapted by choosing different attributes and weightings to meet objectives of most projects. The approach has already been successfully applied to projects seeking outcomes for river health, natural regeneration of paddock trees and particular threatened species.

### **Auctions for conservation contracts: an empirical examination of Victoria's Bush Tender trial**

**Gary Stoneham, Vivek Chaudhri, Arthur Ha and Loris Strappazon**

*The Australian Journal of Agricultural and Resource Economics*, 47(4): 477–500. 2003.

#### **ABSTRACT**

The present paper proposes that markets for nature conservation on private land are missing because of the problem of asymmetric information. An auction of conservation contracts was designed to reveal hidden information needed to facilitate meaningful transactions between landholders and government. The present paper describes the key elements of auction and contract design employed and the results obtained from a pilot auction of conservation contracts run in two regions of Victoria. The pilot demonstrated that it was possible to create at least the supply side of a market for nature conservation and in conjunction with a defined budget, prices were discovered and resources allocated through

contracts with landholders. The present paper compares a discriminative price auction with a hypothetical fixed-price scheme showing that an auction could offer large cost savings to governments interested in nature conservation on private land. The paper identifies some important design problems that would need to be solved before auctions could be applied more broadly including: multiple complementary outcomes, reserve prices, sequential auction design and contract design. Nevertheless, the paper does show that auctioning conservation contracts for environmental outcomes is an important new policy mechanism that deserves closer examination.

### **Permits, auctions and output**

**Gary Stoneham, Mark Eigenraam, Charlotte Duke and Loris Strappazon**

*Presented to the 45th Annual Australian Agricultural and Resource Economics Conference (Adelaide), January 2001*

#### **ABSTRACT**

In this paper, we develop a formal model that combines point-source emitters of waste, with landholders that can provide pollution-offset activities, in one 'environment economy'. We use the model to

demonstrate the societal benefits of such a system relative to a stand-alone tradable permit scheme. In the model we explicitly consider the effect of the scheme on point-source emitters' output.

## **Auctions for multiple environmental outcomes, from desk to field in Victoria Australia**

**Mark Eigenraam, Craig Beverly, Gary Stoneham and James Todd.**

*80 th Annual Western Economic International Association Conference, July 4-July 8, San Francisco, California.*

### **ABSTRACT**

This reports on an Australian pilot (EcoTender) of an auction for multiple environmental outcomes. The success of the auction is due to a linkage between the auction process and innovative Catchment Modelling Framework (CMF) used to estimate multiple environmental outcomes including carbon, terrestrial biodiversity aquatic function and saline land area. Auctions have been used in the past to distribute environmental funds. BushTender, a single dimension auction (one environmental outcome) demonstrated significant cost savings are achieved when compared to other grant based approaches (Stoneham et al. 2003). In general, auctions aim to provide private landholders with the incentive to truthfully reveal their cost of undertaking specified actions that produce environmental outcomes. If correctly applied auctions can help to overcome common problems involving asymmetric information-where landholders have information about the cost of undertaking an action but this information is hidden from the agency who is providing the funds. The agency

needs both cost information from landholders and information about environmental outcomes (missing information) provided by the proposed landuse change, to make decisions between environmental management options and allocate funds. This is the first time a market-based policy has been fully integrated from desk to field with a biophysical framework for the purchase of multiple outcomes. The CMF incorporates a suite of one-dimensional plant-based models that are explicitly linked to a fully distributed 3D-groundwater model. This framework solves the missing information problem of linking paddock scale landuse and management to catchment scale environmental outcomes. The framework also incorporates a number of biodiversity algorithms that estimate current and future ecosystem benefits. This framework provides the Victorian government with a replicable transparent evidence-based approach to the procurement of environment outcomes. The framework can be applied in any location if data are available for calibration and validation.

## 4. MITIGATING HUMAN WILDLIFE CONFLICTS

In this section we examine issues related to tackling human-wildlife conflicts which arise due to livestock and crop depredation by wild animal. We provide an overview of current conflict resolution practices their efficiency and innovative economic approaches adopted in different parts of the world to minimize conflicts.

Human-wildlife conflict (HWC) occurs when human and wildlife activities coincide and occurs mainly around fringes of protected areas and is a challenge for conservation of large ranging animals that exploit the same resources as humans, like large carnivores and elephants. In developing countries HWC results in a great cost to biodiversity and rural economies. Treves (2007) addresses the issue of human-wildlife conflict and discusses various measures adopted to mitigate conflict. The author outlines the wildlife dimensions of HWC, reviews our understanding of affected people's perceptions of risk and resolution, traces paths to successful intervention through participatory planning and co-management, and examines the key role of research in the resolution of HWC. The author suggests the superiority of incentives over compensation and strongly recommends measures to increase human tolerance to wildlife conflict, especially with well designed incentive schemes.

Zabel and Holm-Muller (2008) discuss the efficacy of conservation performance payments, a PES approach, introduced by the Swedish government in 1996 to conserve carnivores such as wolverines and lynx which were persecuted by the local reindeer herders. These payments were made to communities for the number of carnivore offspring in a particular site irrespective of

the actual predation incidents. Additionally, they also examined carnivore reproduction data from 1996 to 2006 and report an upward trend from 2000 onwards. However they could not ascertain whether this was due to success of the scheme or due to other natural factors or improved methods of data collection. But, it still remains a possible alternative to conventional strategy to tackle carnivore-livestock conflict.

Mishra et al (2003) provide details of how direct payments and indirect payment incentive schemes have been successful in reducing carnivore livestock conflicts in India and Mongolia. The snow leopard in Spiti, India, faced danger from prey-livestock competition and in Mongolia prey declines were caused due to poaching for meat and trophies. In the Indian context direct payments were made to the community for setting aside grazing land for wildlife and they also initiated livestock insurance and incentive schemes for better herding. In Mongolia the conservation contracts were designed around enhancing value of raw wool by manufacturing handicrafts and an assured procurement scheme was developed. Incentives were also provided for compliance with the contracts. Their results from both sites show increase in wild prey populations, change in people attitude towards wildlife conservation due to a well designed incentive scheme and that communities honor such conservation contracts. A well designed payment scheme requires good understanding of the current situation and strong baselines data which include biological and socio-economic indicators and more importantly monitoring outcomes of various interventions (Mishra et al 2003; Treves, 2007)

## Balancing the needs of people and wildlife: When Wildlife Damage Crops and Prey on Livestock

Adrian Treves,

*University of Wisconsin-Madison, 2007.*

### ABSTRACT

In this report, the author addresses the issue of human-wildlife conflict and discusses various measures adopted to mitigate conflict. He outlines the wildlife dimensions of HWC, reviews our understanding of affected people's perceptions of risk and resolution, traces paths to successful intervention through participatory planning and co-management, and examines the key role of research in the resolution of HWC. Spatial analysis revealed patchiness of HWC wherein a minority of individual large mammals posed a threat and a minority of households suffered heavy loss. The author suggests that broad scale interventions were ineffective in dealing with HWC. Killing problem animals has been the traditional approach. Non-lethal control rather than lethal control were found to be more effective from both cost and conservation standpoints. The author suggests multiple interventions and the ones dealing with changing both wildlife and human behaviour to successfully deal with HWC. A combination of direct (barriers, guards, repellents etc.) and indirect interventions (compensation and incentives, participation, research and environmental education) will thus be required. An important point made is the superiority of incentives over compensation. Incentives,

material or technical, are preventative rather than reactionary like compensation, which is made after the loss has occurred. Further compensation has been criticized for promoting dependency on donors. Arriving at appropriate interventions and implementation requires optimal participation of people in planning and co-management. Traditional interventions methods can be learnt through a participatory process, which are more acceptable and cost effective. Participation also helps to change perceptions, which are a decisive factor in HWC resolution. Monitoring outcomes of various interventions are often overlooked in projects. Alternative intervention methods will have different outcomes for vulnerability of affected households and these will change with changing conditions. Therefore, monitoring the outcomes of different methods is essential especially when technical and material interventions have been put in place. Lastly, the author suggests research for collecting baseline information on HWC and developing a deep understanding of the various human and wildlife dimensions at specific sites. Social science inputs are important because HWC is as much a social problem as a technical challenge.

## Conservation Performance Payments for Carnivore Conservation in Sweden

Astrid Zabel and Karin Holm-Muller,

*Conservation biology, Vol. 22 (2):247-251. 2008.*

### ABSTRACT

Livestock predation by large carnivores and the subsequent elimination of carnivores by livestock owners are some of the most persistent problems faced by managers and conservationists alike. Measures to mitigate conflict usually involves ex post compensation given to the farmers for loss of their livestock. Although compensation scheme has been widely used to mitigate the conflict, they have not always been successful due to problems of high transaction costs, long time lags and problems of trust and transparency. In this context, PES as an alternative strategy to mitigate conflict is a possible solution. Zabel and Holm-Muller (2008) discuss the efficacy of conservation performance payments introduced by the Swedish government in 1996 to conserve carnivores such as wolverines and lynx which

were persecuted by the local reindeer herders. Here the conservation outcome was number of carnivore offspring in a particular site. The payment amount was calculated to offset all future loss of livestock due to predation by these offspring. In 2007, the payment amount for every certified wolverine and lynx reproduction was about US\$ 29,000. These payments were made irrespective of the actual predation incidents. Since the payments were made when the animals were too young to cause any damage, there were no time lags too. Also, the herders did not have to bear additional costs of searching for their livestock killed by predators or filing for compensation. Payments were also made for occasional sightings of lone animals, although these were much lower than payments for offspring. The

payment for occasional sightings of wolverines and lynx were approximately US\$ 10,150 and US\$ 5075. In the Swedish case, the payments were given to groups rather than individuals since most often conservation outcomes are a collective responsibility. Once the payments were made, groups had the right to decide how the payments were distributed and used. The authors examined the context of internal management of payments and how effectively it tackles the issue of prisoner's dilemma. Since the payments are given to groups, they need to be sufficiently large and equitably distributed among the members so that each individual has an incentive to conserve carnivores. The authors examined if the herders had devised a common-pool regime for distribution of payments for collective action for conservation. They determined this in the context of four cardinal principles that are supposed to facilitate long term resource management. These principles were: a) clearly defined boundaries b) minimal recognition of rights to organize c) collective-choice management and d) congruence between appropriation and provision rules and local conditions. Information for the first two principles were collated from legal documents. To obtain information for the last two principles, they conducted questionnaire based survey of 51 villages. They found out that, the conservation performance-payment scheme functioned within the purview of the four principles to a large extent. The first principle of clearly defined boundaries was satisfied as the herders operated within clear geographical boundaries and there were also clear laws to assign payments in the event of carnivore reproduction at the border of two villages. The

second principle was also met since the villagers had full rights over management and distribution of payments. The villagers also collectively decided on the use and distribution of payments. Besides, many of the villages were flexible and adapted the rules to suit existing conditions. In order to evaluate the fourth principle, they assessed relationship between payment allocation and differences in exposure to carnivore attacks among individual herders in a community. They found that in a majority of the villages with equal exposure to carnivore attacks, they invested the payments in community's common expenses. In villages with unequal exposure to carnivore attacks, payments were given to individuals. Additionally, they also examined carnivore reproduction data from 1996 to 2006. Although there was an upward trend from 2000 onwards, they could not ascertain whether this was due to success of the scheme or due to other factors such as natural factors or improved methods of data collection. They observed that although it is not possible to affirm the success of the scheme, the existing internal management of the herder communities created conducive conditions for conservation payment scheme to work. They conclude that whether such a scheme would be an alternative for ex post compensation scheme in other countries requires further research. It depends upon factors such as institutional setting, property rights in terms of clear boundaries and whether it would be viable to make payments to individuals or groups. But, it is still remains a possible alternative to conventional strategies to tackle carnivore-livestock conflict.

### **The role of incentive programs in conserving the snow leopard**

**Charudutt Mishra, Pricella Allen, Tom McCarthy, M. D. Madhusudan, Agvaantserengiin Bayarjargal, and Herbert H. T. Prins,**  
*Conservation Biology, Vol. 17(6): 1512-1520. 2003.*

#### **ABSTRACT**

**P**astoralists and their livestock share much of the habitat of the snow leopard (*Uncia uncia*) across south and central Asia. The levels of livestock predation by snow leopard and other carnivores are high, and retaliatory killing by the herders is a direct threat to carnivore populations. Depletion of wild prey by poaching and competition from livestock also poses an indirect threat to the region's carnivores. Conservationists working in these underdeveloped areas that face serious economic damage from livestock losses have turned to incentive programs to motivate local communities to protect carnivores. We describe a pilot incentive program in India that aims to offset

losses due to livestock predation and enhance wild prey density by creating livestock-free areas on common land. We also describe how income generation from handicrafts in Mongolia is helping curtail poaching and retaliatory killing of snow leopards. However, initiatives to offset the costs of living with carnivores and to make conservation beneficial to affected people have thus far been small, isolated, and heavily subsidized. Making these incentives more comprehensive, expanding their coverage, and internalizing their costs are future challenges for the conservation of large carnivores such as the snow leopard.

## 5. LONG TERM FUNDING MECHANISMS

In the long run with a change in policies we expect innovative payments for conservation effort will become part of the Government's conservation agenda. In this section we look at possible long term funding sources that can potentially fund such conservation incentives. We look at possible linkages with a well designed eco-tourism operation and how it can not only fund the payments, but also reduce the negative impacts of tourism that affect most of our protected areas. We also explore the possibility of using carbon markets to fund these payments. It is well acknowledged that these are not the only sources of funds that can reduce burden on taxpayers, there are several other possibilities like tying up with Corporate Social Responsibility funds, philanthropic donations and environment or ecological safeguard policies. The idea is to provide a mechanism that not only channelize such funds but to manage it well and derive the desired conservation outcomes.

Success in community based conservation projects depend on a direct link between benefits to the community and conservation outcomes. Earlier community based conservation projects have often failed at achieving conservation goals because the linkage remained unclear or weak. Increasingly eco-tourism is being looked upon as an alternative to build this link. In the current context uncontrolled expansion of ecotourism is a threat to conservation, than aiding conservation efforts. This threat can be minimized and returns from eco-tourism can be utilized to aid conservation programs if they are well designed and actually lined to conservation outcomes. An economic approach to address this issue has been tested at a few sites and potential for improving existing models and replication in the Indian context exists.

The Wildlife Conservation Society (WCS) initiated the Tmatboey Ibis Project at Tmatboey village in Kulen Promtep Wildlife Sanctuary, Cambodia. Its aim was to conserve globally threatened large water birds by establishing a local community based tourism enterprise that directly linked revenue to long-term species conservation. The project met with remarkable success but also continues to face challenges. Success of the project may be attributed mainly to the explicit link between benefits and conservation outcomes as well as community ownership of wildlife and forest. A number of other factors also contributed to its success. WCS correctly assessed the viability of the site (Tmatboey village) for its tourism potential.

Tmatboey guaranteed sightings of the Giant and White-shouldered Ibises, rare and critically threatened birds, much sought after by international bird watchers. Tmatboey was situated close to Angkor, a major tourist site, attracting almost two million tourists annually. Besides payments for services provided at the site such as food, accommodation and guides, tourists donated a fixed amount to the village development fund on sighting the Ibis species. A tight link between benefits and conservation was established. WCS made significant investment into infrastructure and services so a business model of fewer but higher paying tourists rather than high volume tourism could generate enough revenue to ensure conservation. WCS invested heavily in capacity building, ensuring that the community took full command of operations and that the venture became self-sustaining in the long-term. Mechanisms to ensure transparency and equitable sharing of income among household were put in place and as many people from the community as possible were involved. At the initial stage direct financial incentives and raising awareness and local pride reduced hunting of key species. Later

part of the revenue from tourism was ploughed back into conservation activities like community patrolling.

One major challenge the project faces is controlling conversion of water bird habitat to farms. Agriculture still remains more lucrative than tourism and conversion of land continues to reduce habitat for the birds. To address this land boundary agreements have been made with the government that include sufficient land for agriculture and residential expansion. However, encroachments still occur. Monitoring efforts in the project have been simple, relying on a single paid ranger who regularly counts nesting ibis pairs and provides information on wetland encroachment and hunting incidence.

In Tanzania, payments for ecosystem services (PES) may be successfully employed as an alternative framework for community-based conservation in situations where a history of conflict over land tenure and resource use exist. The Simanjiro Plains or Maasai Steppe, mostly community owned, provide a key wet season dispersal area for wildebeest and zebra migrating from northern Tanzania's Tarangire National Park. Significant decline in numbers of these and other wildlife due to expansion of agriculture and illegal hunting on the Maasai Steppe raised concerns from both conservationists and private tour operators in Tarangire National Park. Community-based conservation efforts failed due to the region's history of conflict with a centralized system of management and top-down approaches by conservation organizations resulting in an aversion towards wildlife conservation. Community-based tourism was not a viable option for various reasons. Sole success came from the grass-roots approach of Dorobo Tours, which initiated an agreement providing for annual lease payments and per-client, per-night payments to the village in exchange for community allocation of a concession area that excluded agriculture and production of charcoal. This model of conservation was enduring.

A PES framework was designed and an agreement put into place through collaboration of the local community at Terrat village with a diverse group of NGO's and private tourism companies. This creative collaboration along with the presence of Dorobo Tours at the forefront was important to the success of the project. The basic PES concept was that, although the plains were already protected by Terrat as a seasonal livestock grazing reserve (a dry season reserve used mainly July-October), an added financial payment could serve to: a) prevent any future moves by individuals or the community to convert parts of the plains to agriculture; and b) provide incentives for the community to not only tolerate but actually conserve wildlife by protecting it from bushmeat poaching by outsiders. The agreement of payment and incentives bore no cost to the community instead it reinforced traditional land use practices.

PES is known to be best suited to such scenarios, where the opportunity costs of conservation are minimal. It is important to note that at Terrat due to internal tradeoffs retaining grazing land was preferred over conversion to agriculture whereas at Emboreet, another village in the Simanjiro Plains, the opposite was true. Opportunity costs would be different for Terrat and Emboreet, making PES less suitable for the latter. Tourism operators whose business depended on Tarangire National Park pooled resources for the payments, keeping the agreement more like a business deal than a conservation initiative. This was an important strategy given the past history of the region. Arising through a purely adaptive process, the initiative has provided a new and locally acceptable framework for community-based conservation, which could later be scaled up to include other villages in key dispersal areas. The financial aspects related to scaling up are a future challenge as is the continuing conflict over land tenure and resources between the community and higher levels of government.

Global carbon market associated with forestry in developing countries is one of the most innovative PES mechanisms to tackle problems of deforestation. Presently, carbon markets consist of a regulated and a voluntary market. The regulated market developed from the Kyoto protocol and the Clean Development Mechanism (CDM) allows marketing of emission credits for reforestation and afforestation but not for avoided deforestation. The voluntary carbon market has seen most sales of emission reductions from forest related projects as the regulated market complicated rules on project eligibility and higher transaction costs. A policy known as Reducing Emissions from Deforestation and Degradation (REDD) is currently being negotiated under the United Nations Framework Convention on Climate Change that would allow avoided deforestation to be included as a credible source of emissions reduction units within the post- Kyoto international climate policy regime after 2012. The rules and regulations of this potential policy are being widely debated and elaborated upon as REDD pilot projects are being established around the world in anticipation of REDD being implemented in a post-Kyoto framework.

In this case study, Holmes et al. (2008) review the process of developing one of the world's first REDD projects and describe how critical PES and REDD issues have been addressed. The project was carried out in the Makira forests of north-east Madagascar, by the Government of Madagascar and the Wildlife Conservation Society in collaboration with Conservation International and the communities surrounding the Makira forests. These forests containing unique species and ecosystems were under severe threat due to human impacts. In 2001, the International Resources Group (IRG) through the USAID-funded *Projet d'Appui a la Gestion de l'Environnement (PAGE)* project began working

in collaboration with WCS and the Madagascar's Ministry of Environment, Forest and Tourism (MEFT) to identify ways to sustainably finance the protection and management of the Makira Forests. Community management of local forest resources was facilitated and included large tracts of agricultural and forest land.

Conservation agencies were involved in monitoring and co-managing these resources. The first sale of carbon credits, which amounted to approximately \$200,000 was made available for the management of the site. Various monitoring and management strategies were implemented through this project such as: a) efforts to verify carbon emissions reductions generated from the protected area. b) officially demarcating the limits of

the protected area as agreed upon during community consultations. c) developing and enhancing sustainable land use practices. d) developing a management plan for the protected area and formalizing land use management contracts between communities and the national government in the area surrounding the core forest zone of Makira. The Makira Project was successful in fulfilling all the key components of a REDD project and is good example of how various stakeholders such as conservation agencies, scientists, government agencies and local communities can work together to adopt sustainable approaches to create, manage and finance a permanent protected area through marketing emission reduction credits.

### **Tmatboey Community-based Ecotourism Project, Cambodia.**

**Tom Clements, Ashish John, Karen Nielsen, Chea Vicheka, Ear Sokha, Meas Piseth and Hout Piseth.**  
*Ministry of Environment, Cambodia and WCS Cambodia Program. August 2008.*

## EXECUTIVE SUMMARY

The Northern Plains of Cambodia is an area of exceptional importance for biodiversity conservation due to the unique assemblage of endangered wildlife found in the deciduous dipterocarp forests. Local people live in small scattered villages and depend heavily on rain-fed rice field agriculture and natural resources for their livelihoods. Two of the wildlife species present – the Giant and White-shouldered Ibises – are amongst the rarest birds in the world and are highly sought after by international bird-watchers and naturalists. Combined with the Northern Plains' accessibility from Cambodia's main tourism destination of Angkor, at Siem Reap, this makes the area of high potential for ecotourism. Encouraged by a high initial level of demand, WCS has supported a community based ecotourism project since 2004 at Tmatboey village in Kulen Promtep Wildlife Sanctuary. The Tmatboey Ibis Project aims to conserve the globally threatened large waterbirds found at Tmatboey, using the ibises as 'flagships', by establishing a local

community-based tourism enterprise that directly links revenue received to long-term species conservation. This link is provided by the agreement between the government, WCS and the community. All site-based tourism services are organised by the community, with facilitation and training provided by WCS and local NGO partners. Tourist visits directly demonstrate the value of wildlife to the villagers both through donations to a development fund and through individual payments for services, such as food, drink, local guides, cooks and accommodation. This has encouraged the villagers to view wildlife as an important resource that should be conserved. As a consequence, the community has become a partner in nature conservation and has begun to actively protect the ibis species. The Tmatboey Ibis Project has been remarkably successful from a tourism, community development and wildlife conservation perspective. The project has achieved a number of successes with respect to tourism

## **Developing alternative frameworks for community-based conservation: piloting payments for environmental services (PES) in Tanzania's Simanjiro plains**

**Fred Nelson, Maliasili Initiatives.**

*Report prepared for WCS TransLinks Program. July 2008*

### EXECUTIVE SUMMARY

The Simanjiro plains provide a key wet season dispersal area for wildebeest and zebra migrating from northern Tanzania's Tarangire National Park. The plains lie within the boundaries of the lands of three villages occupied by Maasai pastoralists. Wildlife populations have declined substantially over the past two decades, largely as a result of illegal over-hunting and the spread of agricultural land uses in the area. Efforts to enlist local community support for wildlife conservation have, since the 1970s, been undermined by conflicts over land tenure and resource use. In order to address the deteriorating status of wildlife populations and their habitat on the Simanjiro plains, an alternative framework for community-based

conservation was developed starting in 2005 through a payments for ecosystem services (PES) agreement. This agreement emerged from the collaboration of local communities with a diverse group of NGOs and private tourism companies, several of which have extensive and long-term experience in the area. The agreement builds on customary pastoralist land use practices to build village-level incentives for wildlife conservation. The agreement has produced an important new framework for community-based conservation in Tanzanian village lands by overcoming existing institutional impediments to community involvement in wildlife conservation through a cost-effective and administratively simple PES structure.

## **Forest Carbon Financing for Biodiversity Conservation, Climate Change Mitigation and Improved Livelihoods: the Makira Forest Protected Area, Madagascar**

**Christopher Holmes, Jane Carter Ingram, David Meyers, Helen Crowley, and Ray Victorine**

*WCS Madagascar Program August 2008*

### EXECUTIVE SUMMARY

High levels of species endemism, across multiple taxa, and high degrees of habitat loss, particularly deforestation, of the biologically rich Eastern Rainforests biome of Madagascar make the island nation a biodiversity hotspot. The island nation's biological richness stands in stark contrast to the economic privation afflicting most of the country's 18 million people. Greater than 70% of the population lives below the poverty line and 75% live in rural areas dependent solely on natural resources for meeting basic household needs. This dependence on forest resources for subsistence coupled with high rates of population growth, inadequate policy and weak rule of law has resulted in widespread deforestation, fragmentation and general environmental degradation. Since people first inhabited the island, Madagascar has lost 85% of its native forests. Any measure to conserve Madagascar's forests and forest resources, for biodiversity protection and maintenance of critical ecosystem services, must address the economic constraints and challenges that drive deforestation and forest degradation across the country. The sale of carbon dioxide (CO<sub>2</sub>) emissions reductions from avoided deforestation through the growing carbon market may represent a unique

opportunity to reconcile natural resource conservation and poverty reduction in Madagascar. The funds generated from this market can be used to fund protected area creation and management to conserve biodiversity and safeguard critical ecosystem services important for human livelihoods. These funds can also provide financial incentives for community led land stewardship. With this in mind, the Wildlife Conservation Society, the Government of Madagascar and other partners have been working with local communities living in the Makira plateau in north-eastern Madagascar to establish a protected area which will be financed by the marketing and sale of CO<sub>2</sub> emissions reductions credits. The funds from carbon sales, generated through the avoided deforestation of the Makira forest, will be used to finance the long-term conservation of the forests, improve community land stewardship and governance, and support sustainable livelihood practices leading to improved household welfare. This report outlines the process and key steps that have been taken to develop this novel and innovative approach towards forest conservation and poverty reduction in one of the world's most biologically rich and economically poor countries.

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