Working Paper

Compensation and Rewards for Environmental Services in the Developing World:

Framing Pan-Tropical Analysis and Comparison

Brent Swallow, Mikkel Kallesoe, Usman Iftikhar, Meine van Noordwijk, Carina Bracer, Sara Scherr, K.V. Raju, Susan Poats, Anantha Duraiappah, Benson Ochieng, Hein Mallee and Rachel Rumley

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Tel: +254(0)20 7224000, via USA +1 650 833 6645
Fax: +254(0)20 7224001, via USA +1 650 833 6646
Internet: www.worldagroforestry.org
Contact Brent Swallow: B.Swallow@cgiar.org

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The World Agroforestry Centre (ICRAF) and a diverse team of partners were tasked by the International Development Research Centre (IDRC) to contribute to the conceptualization and development of their Rural Poverty and Environment (RPE) programme related to Compensation and Rewards for Environmental Services (CRES) by providing an overview of relevant developments in Africa, Asia and Latin America, a global synthesis of results and recommendations. Truly global in nature, the CRES Scoping Study was undertaken by the following partners and collaborators based in 7 countries across 4 continents.

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Forest Trends is an international non-profit organization that works to expand the value of forests to society; to promote sustainable forest management and conservation by creating and capturing market values for ecosystem services; to support innovative projects and companies that are developing these new markets; and to enhance the livelihoods of local communities living in and around those forests. We analyze strategic market and policy issues, catalyze connections between forward-looking producers, communities and investors, and develop new financial tools to help markets work for conservation and people. www.forest-trends.org

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About the authors

Brent Swallow	Principal Scientist and Theme Leader for Environmental Services, World Agroforestry Centre (ICRAF) Nairobi, Kenya. Overall Coordinator of the CES Global Scoping Study.
Mikkel Kallesoe	Senior Programme Officer, Asia Regional Environmental Economics Programme, World Conservation Union (IUCN), Colombo, Sri Lanka.
Usman Iftikhar	Environmental Economist, Coordinator, Asia Regional Environmental Economics Programme, World Conservation Union (IUCN), Colombo, Sri Lanka.
Meine van Noordwijk	Regional Coordinator, Southeast Asia Programme, World Agroforestry Centre (ICRAF), Bogor, Indonesia.
Carina Bracer	Project Manager with the Ecosystem Services Program, Forest Trends, Washington, DC, USA. Manages the new regional Katoomba Group for Tropical America, including strategic linkages to the Ecosystem Marketplace.
Sara Scherr	Agricultural and natural resource economist specializing in land and forest management policy in tropical developing countries. Director of Ecoagriculture Partners, an international partnership to promote increased productivity jointly with enhanced natural biodiversity and ecosystem services in agricultural landscapes.
K.V. Raju	Professor and Head, Centre for Ecological Economics and Natural Resources (CEENR), Institute for Social and Economic Change (ISEC), Bangalore India.
Susan Poats	Anthropologist with a strong commitment to conservation and sustainable development. She is a founding member of Corporación Grupo Randi Randi (CGRR), Quito, an Ecuadorian non-profit organization.
Anantha Duraiappah	Chief, Analysis and Emerging Issues Unit, Division of Environmental Law and Conventions (DELC), United Nations Environment Programme (UNEP) Nairobi, Kenya.
Benson Ochieng	African Centre for Technology Studies (ACTS), Nairobi, Kenya. Currently Institute for Law and Environmental Governance, Nairobi, Kenya.
Hein Mallee	Senior Programme Specialist, Rural Poverty and Environment programme (RPE) International Development Research Centre (IDRC), Singapore.
Rachel Rumley	Media Associate, World Agroforestry Centre (ICRAF) Nairobi and Assistant Coordinator Global Scoping Study on CES.

Abstract

This is the first of a series of nine papers exploring the state of the science and practice of compensation and rewards for environmental services in the developing world. This study has been undertaken to address key questions about the impact and future prospects of compensation and rewards for ecosystem services, and the potential role of research and policy engagement in helping to make these instruments more beneficial to the poor in the developing world. The papers resulting from this study have been prepared by an international group of authors as part of a pan-tropical scoping study for the Rural Poverty and Environment Programme of the International Development Research Centre of Canada. All of the papers focus on the frontiers between the ecosystems that underlie rural livelihoods, the environmental services that those ecosystems generate, and the human well-being of rural populations.

This introductory paper begins with a review of the recent historical development of compensation and reward mechanisms within a broader context of changing approaches to conservation and environmental policy. Conservation approaches have moved from a sole focus on protected areas, to integrated conservation and development projects, to landscape management approaches, and now, consideration of conservation contracts. At roughly the same time, there has been a general relaxation of government enforcement of environmental regulations towards more multi-stakeholder forms of governance in which non-governmental and international organizations play roles and a variety of market-based and negotiation approaches have come to the fore. That dynamic context is fostering greater interest in mechanisms for compensation and reward for environmental services in the developing regions of the world. Later sections of the paper clarify key concepts and present a conceptual framework for characterizing different types of mechanisms and the internal and external factors affecting those mechanisms. The penultimate section summarizes experience and perceptions of compensation and reward for environmental services. The concluding section postulates the alternative motivations that are shaping compensation and reward mechanisms in the developing world.

Keywords

Environmental services, conservation, compensation and reward mechanisms, ecosystem services, ecosystem stewards, environmental service beneficiaries, payment for environmental services

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The ideas presented here have gradually matured in discussions with many of the participants to the Regional Workshops, the final writeshop and (co)authors of other issue papers. We gratefully acknowledge their interest and discussion. We also acknowledge the generous financial and intellectual support of the International Development Research Centre of Canada (IDRC), particularly the Rural Poverty and Environment Group.

Preface

From the beginning of 2006 until March 2007, the World Agroforestry Centre (ICRAF) led a consortium of organizations and individuals from around the world in a pan-tropical scoping study of Compensation and Rewards for Environmental Services (CRES). The scoping study was commissioned by the Rural Poverty and Environment Programme of the International Development Research Centre of Canada (IDRC) to identify critical issues affecting the development, operation, impacts and institutionalization of mechanisms linking beneficiaries of ecosystem services with stewards of those ecosystems. Particular attention is paid to the potential for CRES to alleviate or exacerbate the multiple dimensions of poverty: rights to productive assets, streams of income and consumption, and vulnerability to shocks.

The scoping study included a series of regional workshops held in Latin America (Quito, Ecuador), Asia (Bangalore, India) and Africa (Nairobi, Kenya). Participants presented and discussed practical CRES experiences from across the developing world, experiences which informed and challenged the development of several cross-cutting issue papers. A series of nine working papers have been prepared to summarize the results of the scoping study, including an introductory paper, three regional workshop reports, and five issue papers on key topics.

ICRAF Working paper 32 – Compensation and Rewards for Environmental Services in the Developing World: Framing Pan-Tropical Analysis and Comparison.

ICRAF Working paper 33 – Report on the Latin American Regional Workshop on Compensation for Environmental Services and Poverty Alleviation in Latin America.

ICRAF Working paper 34 – Asia Regional Workshop on Compensation for Ecosystems Services. A component of the global scoping study on compensation for ecosystem services.

ICRAF Working paper 35 – African Regional Workshop on Compensation for Ecosystem Services (CES).

ICRAF Working paper 36 – Exploring the inter-linkages among and between Compensation and Rewards for Ecosystem Services (CRES) and human well-being: CES Scoping Study Issue Paper no. 1.

ICRAF Working paper 37 – Criteria and indicators for environmental service compensation and reward mechanisms: realistic, voluntary, conditional and pro-poor: CES Scoping Study Issue Paper no. 2.

ICRAF Working paper 38 – The conditions for effective mechanisms of Compensation and Reward for Environmental Services (CRES): CES Scoping Study Issue Paper no. 3.

ICRAF Working paper 39 – Organization and governance for fostering pro-poor Compensation for Environmental Services: CES Scoping Study Issue Paper no. 4.

ICRAF Working paper 40 – How important will different types of Compensation and Reward Mechanisms be in shaping poverty & ecosystem services across Africa, Asia & Latin America over the next two decades? CES Scoping Study Issue Paper no. 5.

The working papers are designed for relatively limited circulation of preliminary material. We anticipate that all of the papers will be revised and published in a formal outlet within the next year.

Brent Swallow
World Agroforestry Centre
Nairobi, Kenya

Hein Mallee
International Development Research Centre
Singapore

Contents

Acronyms

ACTS	the African Centre for Technology Studies
BBOP	Business and Biodiversity Offset Programme
CBD	Convention on Biological Diversity
CES	Compensation for environmental services
CGRR	Corporación Grupo Randi Randi
CRES	Compensation and rewards for environmental services
CSR	Corporate Social Responsibility
ICDPs	Integrated conservation and development projects
ICRAF	World Agroforestry Centre
IDRC	International Development Research Centre, Canada
ISEC	Institute for Social and Economic Change, Bangalore, India
IUCN	World Conservation Union
MA	Millennium Ecosystem Assessment
NEPIs	New Environmental Policy Instruments
PES	Payment for environmental service
RES	Rewards of environmental services
RPE	Rural Poverty and Environment Programme
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
WWF	Worldwide Fund for Nature

1. Introduction

The importance of ecosystems to human societies has long been recognized for the production of the many and varied ecosystems services upon which life is based. Ecosystems provide products of direct value to people – food, fiber and fuel – and also an array of indirect benefits – water filtration, climate regulation, nutrient cycling, pollination, pest control and disease regulation – that support and promote the natural resource base upon which economic activities are founded. Healthy ecosystems are particularly important to the rural poor of the developing world, people who often live in very close connection to their natural surrounding. While the rural poor tend to derive large portions of their livelihoods from terrestrial and aquatic ecosystems, they also tend to be very vulnerable to deterioration in those ecosystems and the services that those ecosystems provide. Despite the importance of ecosystem services to poverty reduction, sustainable livelihoods and economic development, ecosystems and their constituent goods and services continue to decline at alarming rates. The Millennium Ecosystem Assessment (MA) (2005) has helped to clarify the linkages between ecosystems, the benefits that people derive from those ecosystems, and human well-being, as well as the magnitude and global nature of the degradation of ecosystems.

A major reason for the rapid decline in ecosystems is that many ecosystem services are not priced or assigned value by the prevailing paradigms of production, exchange and regulation. While there are markets for many of the 'provisioning' ecosystem services, there tend to be very incomplete or missing markets for 'regulating', 'supporting' and 'cultural' services. Reasons for market failure are well known to students of economics: many of these services have the attributes of economic public goods or are highly influenced by environmental externalities. Many cultural services have public good characteristics: they are non-rival in consumption (meaning that one person's consumption of the good does not affect another person's ability to consume the product) and non-excludible (impossible or very costly to exclude free riders). On the other hand, many of the regulatory services of ecosystems, such as water filtration, are highly influenced by positive or negative externalities: the behaviour of an upland agro-processor affects the quality of water available to downstream residents.

Societies have devised a number of public policy instruments to cope with market failures. Some of these instruments, particularly regulatory, property rights, and financial instruments,

have been used for environmental governance for many years. Most of these instruments are implemented in a top-down rigid manner, earning them the name 'hard policy instruments'. Over the last twenty to thirty years, a variety of new environmental policy instruments have been devised and implemented. Most of these instruments are more flexible and subject to negotiation, multi-stakeholder dialog, and based on market principles of efficiency, earning them the names 'soft policy instruments' or 'market-based instruments'. The following short paragraphs provide a quick overview of these instruments. Later sections of the paper address some of these in more detail.

Regulatory instruments have been a mainstay of the 'command-and-control' approach to environmental management for many years, setting and enforcing uniform minimum standards of technology or performance for all firms (Stavins 2002, p.1). Regulatory systems include rules, systems to modify rules as needed, and mechanisms for their enforcement. Regulations can be distinguished by what they proscribe: the use or non-use of specific technologies, environmental outcomes from specific activities, or environmental outcomes from firms or industries.

Property rights instruments have long been used by governments to pursue combinations of economic, social and environmental objectives, including state ownership and management of critical resources as well as systems to register and enforce more secure property rights for individuals or groups. Conservation and environmental easements are property rights instruments that are specifically designed to advance environmental policy objectives. Conditional forestry co-management, in which communities or user groups gain conditional limited rights to forests in exchange for following specific management plans, are another new property rights instrument.

Communicative instruments use selective communication to persuade and advocate certain types of behaviour. Public systems for extension of information about soil and water conservation have been a mainstay of rural environmental management in the developing world for many years. Public disclosure and shaming are often the main instruments available to non-governmental organizations. Private firms invest heavily in advertising and often undertake investments in public environmental management in order to be able to advertise that they are good corporate citizens.

Financial instruments use financial incentives to reduce environment-damaging activity or enhance environment-friendly activity. Financial incentives include taxes and subsidies on inputs, information, outputs or economic activity; fines on prohibited activity, and investments in social or physical assets. Financial instruments with an environmental focus include subsidies or tax relief for the use of clean technology and sharing of eco-tourism revenue with communities impacting on protected areas.

Tradeable permit or credit systems establish limits or 'caps' on the allowable levels of total resource use or pollution emissions, allocate permits or credits to portions of those caps, and facilitate banking or trading of the permits. Cap-and-trade systems have been established to manage water allocation and to limit water and air pollution. Trading in SO_2 emissions in the United States has been the largest cap-and-trade system, but now is being eclipsed by international carbon dioxide trading schemes such as the European Union Emissions Trading Scheme.

Voluntary environmental management systems such as the EU's Environmental Management and Audit system and the ISO14001 standards encourage industries to operate more responsibly. These systems require firms to audit the environmental impacts of their operations, establish internal audit systems to manage and minimize their impacts, and regularly issue stakeholders with a report. Firms that participate in these schemes are given logos by relevant authorities to use in their advertisements (Jordan, Wurzel and Breuckner 2003). There are multiple ways in which companies may recoup the benefits of following such schemes: attracting consumers, investors or workers to their companies. They may also be able to forestall or prepare their businesses for environmental regulations.

Eco-labelling is part of a larger trend, particularly in Europe, of ethical consumption, in which consumers are provided with information about the production processes, returns to producers, and environmental impacts of the products that they buy. The OECD recognizes three types of eco-labels: (1) a Type 1 label refers to the environmental quality of the product compared to the rest of the products, with a third-party certification scheme that is often government supported; (2) a Type 2 label is a one-way communication from producers to consumers, making a claim for the product; and (3) a Type 3 label uses pre-set indices and gives quantified information about products that are independently verified (Gallastegui 2002). Tropical

products most influenced by these mechanisms are forest products (Stringer 2006), coffee (Muradian and Pelupessy 2005) and eco-tourism.

Environmental offset schemes are voluntary or mandatory arrangements in which firms, industries or national governments offset unavoidable environmental damage in one location with investments in environmental conservation in another location. Carbon and biodiversity are the main focus of offset programmes at present. The Wetland Mitigation Banking operating in the United States is an advanced model of an offset scheme.

Negotiated agreements between government and industry are very common in Europe and becoming more common in developing countries as the environment agencies try to enact new environmental laws (Jordan, Wurzel and Breuckner 2003).

Self-negotiated deals or facilitated agreements between ecosystem stewards and environmental service beneficiaries[1] are one of the newer contractual instruments, mostly involving water utilities or large water users making conditional payments to upland farmers who maintain or restore land cover consistent with good water quality. Latin America has been particularly receptive to these mechanisms, with working mechanisms established in Costa Rica, Colombia, Ecuador, Mexico, and other countries (Pagiola, Arcenas and Platais 2005).

The terms '*payment for environmental services*' and '*payment for ecosystem services'* have been widely used to describe new types of flexible environmental policies, voluntary agreements and contractual instruments that have emerged in the developing world over the two last decades. Wunder (2005, p. 9) provided a narrow definition of payment for environmental service as "*a voluntary transaction where a well-defined environmental service (or a land use likely to secure that service) is being bought by a (minimum one) buyer from a (minimum one) seller, if and only if the environmental service provider secures the environmental service provision"*. Forest Trends considers a broader range of instruments as payments for environmental services, including (1) public payment schemes to private land and forest owners to maintain or enhance ecosystem services {a type of financial instrument};

[1] Environmental service beneficiaries are a subset of all people who benefit from ecosystem services. That is, ecosystem service beneficiaries include people who benefit from the purely private goods (e.g. food crops) that ecosystems generate, and are exchanged in regular commodity markets. Environmental service beneficiaries benefit from non-provisioning services for which markets do not readily develop because of some combination of high exclusion costs, non-rivalrous consumption, or significant externality effects.

(2) open trading between buyers and sellers under a regulatory cap or floor on the level of ecosystem services to be provided {tradeable permit or credit systems}; (3) self-organized private deals in which individual beneficiaries of ecosystem services contract directly with providers of those services {self-negotiated deals}; and (4) eco-labeling of products that assures buyers that production processes involved have a neutral or positive effect on ecosystem services {eco-labelling}.

There are optimistic and pessimistic views of these attempts to harness market forces for ecosystem management. Relatively conservative government agencies may see these flexible institutions as a challenge to their hegemony and simpler systems of command-and-control. Bell (2003) describes the failure of some new market instruments in the United States and urges governments in developing countries to be realistic about the challenges and limitations of using market instruments for environmental management. Pagiola et al. (2004) are among a group of analysts who are optimistic about the potential of payments for ecosystem services to contribute to ecosystem management, but feel that this function can be undermined if the same mechanisms are expected to contribute to poverty reduction. While some conservation experts see market-based mechanisms as a way to harness significant new investment in conservation (Gutman 2003), others see the same mechanisms as the start of a thin edge of 'selling nature' (discussions during the Asia regional workshop). Experience from the Philippines and Indonesia suggests that indigenous and disenfranchised local communities may be able to use market-based mechanisms to maintain secure property rights to land and forest resources and thus enhance their income streams (Rosales 2003). Many groups that advocate for those communities, however, see payment for environmental service (PES) mechanisms as undermining the rights and well-being of the poor. However, in their review of 'PES-like' schemes in Bolivia, Robertson and Wunder (2005) found some evidence that the schemes were contributing to the well-being of poor people and no evidence of the schemes damaging the poor. Overall, one might conceive of four extreme circumstances of tradeoff or complementarity between environmental conservation and human well-being: (1) PES mechanisms may lead to win-win solutions, with the environment conserved and the poor made better off; (2) PES mechanisms may contribute to environmental conservation, but at the expense of the poor who are reliant on those resources; (3) PES mechanisms may strengthen the rights and well-being of the poor, but at the expense of ecosystem services that are most

highly valued by the larger society; or (4) PES mechanisms may contribute to the continued degradation of ecosystems, while undermining the rights and well-being of the poor.

This paper is the first in a series of nine related papers that review the state of the science and practice of compensation and rewards for ecosystem services in the developing world. As discussed in section 4 below, we use compensation and reward for ecosystem services to refer to a range of mechanisms linking ecosystem stewards and environmental service beneficiaries, including the mechanisms normally included under the term payment for ecosystem service. This review has been undertaken to address key questions about the impact and future prospects of compensation and rewards for ecosystem services, and the potential role of research and policy engagement in helping to make these instruments more beneficial to the poor in the urban and rural landscapes in the developing world. This introductory paper reviews key concepts and perspectives that underlie the other papers. There are five other papers in the series:

Issue Paper 1: Exploring the inter-linkages among and between compensation and rewards for ecosystem services (CRES) and human well-being

Issue Paper 2: Criteria and indicators for environmental service compensation and reward mechanisms: realistic, voluntary, conditional and pro-poor

Issue Paper 3: The conditions for effective mechanisms of compensation and reward for environmental services

Issue Paper 4: Organization and governance for fostering pro-poor compensation and rewards for environmental services

Issue Paper 5: How important will different types of CRES mechanisms be in shaping poverty and ecosystem services across Africa, Asia and Latin America over the next two decades?

This set of nine papers has been prepared as part of a Pan-Tropical Scoping Study of Compensation and Rewards for Environmental Services for the Rural Poverty and Environment Programme (RPE) of the International Development Research Centre (IDRC). The papers have benefited from multiple inputs. First, an extensive review of the literature and experience was undertaken, with emphasis on experience in Latin America, Africa and Asia,

recognizing that experience in those regions has often been motivated by experiences in North America or Europe.[2] Second, all of the organizations involved in the scoping study have previous experience in various aspects of compensation and rewards for ecosystem services.[3] Third, the authors of the papers participated in, and have access to the proceedings from, regional workshops held in Latin America, Asia and Africa in April and May of 2006.[4] Fourth, drafts of all papers were presented and discussed during the regional workshops and the author's writeshop convened in June 2006 in Nairobi, Kenya. The concepts and frameworks presented in this paper were presented and discussed at all of the previous workshops, in subsequent discussions among the broader research team, and at a meeting of the IDRC RPE group in Bali, Indonesia in June 2006.

The remainder of this paper proceeds as follows. Section 2 presents a review of the experience with conservation, largely in the developing world, in which compensation and rewards for ecosystem services have come to be viewed from two perspectives: as sources of conservation finance and as instruments that can make environmental conservation compatible with poverty reduction. Section 3 is a review of the experience with new market instruments for environmental policy, showing how those largely began in North America and Europe and have expanded over time from flexible mechanisms for compensation for ecosystem damage, to now include compulsory and voluntary mechanisms of reward for ecosystem stewardship and restoration. There has also been some expansion of the mechanisms over space, from Europe and North America to Latin America, Asia and Africa. Section 4 picks up and expands upon three of the themes from section 3, structured by a conceptual model of ecosystem services, ecosystem stewards, environmental service beneficiaries and intermediaries. One of the themes is the importance of distinguishing between compensation for ecosystem damage versus rewards for ecosystem stewardship and restoration. Section 5 explores the linkages between compensation and rewards for ecosystem services and the wider public policy and

2 The primary geographic scope of this scoping study is given by the geographic focus of the RPE programme: the Nile Basin, south-eastern Africa, Sahel, Central Andes, Amazonia, Western Caribbean and Central America, Mekong Delta, China, and South Asia. The RPE programme also includes North Africa and West Asia.

3 The Scoping Study is financed by the International Development Research Centre and coordinated by the World Agroforestry Centre. Partners in the study included the World Conservation Union (IUCN), Forest Trends, the Division for Environmental Conventions of the United Nations Environment Program, Corporación Grupo Randi Randi (Ecuador), the African Centre for Technology Studies, the Institute for Social and Economic Change (India).

4 Summary reports on the regional workshops have been prepared by Poats (Latin America), Raju et al. (Asia) and Ochieng, Otiende and Rumley (Africa).

social context within which ecosystem stewards, beneficiaries and intermediaries interact. Section 6 presents an overview of the current situation of CRES in developing countries, while Section 7 presents a number of conclusions.

2. Evolution of conservation perspectives

An early conservation approach can be termed the wilderness conservation approach, with roots in the 19th century European approach to forest management. This approach invoked environmental conservation as a rationale for excluding common people from forests, mostly to the benefit of wealthy forest concessionaires. In the developing world, the wilderness conservation approach had greatest influence in southeast Asia where upland areas were declared as forest estates where human settlement should be severely limited. Seventy percent of Indonesia continues to be managed as state forest estate, despite the fact that some 50 million people now live in those areas; many areas were deforested decades ago, and many other areas high tree cover actually managed as agroforests by local populations (Fay and Michon 2003).

The protected area approach became the backbone of the western conservation movement in the 20th century. From a conservation perspective, this approach symbolically proposed the building of a new Ark, isolating and protecting designated areas and species from surrounding areas of human impact. The fundamental understanding underlying this approach was that growth of human populations and economic activity is invariably destructive to the environment, and therefore there is a need to protect areas of acute stress through managerial or legal means. The wilderness conservation perspective may have motivated most of the best known of the early environmental organizations such as the IUCN, WWF and the Sierra Club. In the United States, this led to the establishment of the National Parks system, which continues to inspire the parks approach to conservation across the world. The wilderness conservation perspective also underpinned the Biosphere Reserve approach of UNESCO's Man and Biosphere programme. Biosphere reserves usually consists of three concentric rings, which include an inner ring or core conservation area, a middle ring most often referred to as the buffer zone, and a third ring or transition zone where various degrees of human activity occur (Martino 2001). Park creation involved the removal of people from parks and their

resettlement outside of the park boundaries in the transition or buffer zone. Access to the park was largely restricted to local community members, managed by a system of 'fences and fines', and preserved mostly for consumption by tourists. Communities have rarely been compensated adequately for the loss of their land. As a result, poor rural populations have been put at further risk by reduction of production capacity, decreased income, and uncertain land tenure (Neumann 1996; Peluso 1993). To date, the Man and Biosphere program is host to 368 biosphere reserves in 91 countries, and the list continues to grow. The parks approach continues to be the main approach to conservation across the world, with 11.5% of the earth's land area now designated as some type of conservation reserve (Chape et al. 2003). While the wildness conservation perspective has been scrupulously followed in many parts of the developing world, it often has been criticized as quintessentially Northern in orientation, inconsistent and insensitive to the values and practices of people in other parts of the world where it has been applied (Holdgate 1999). There are many people in the conservation community who still ardently defend the protected area approach.

In light of rising concerns about chemical pollution, hazardous waste and human dependence on non-renewable resources, the Club of Rome Report of the 1970s continued to espouse the perspective that economic development is harmful to the environment. Rather than advocating the protection of isolated regions or species, the Club of Rome Report called for a fundamental change in behavior and values, and especially a slowdown or reversal in the rate of economic and demographic change. Nonetheless, the orthodox approach of establishing protected areas to concentrate attention on areas of acute stress and to try to protect them through managerial or legal means still prevailed. Many conservation organizations and professionals continue to stress the importance of the parks approach.

It was not until the formation of the concept of Sustainable Development – introduced by IUCN, WWF and UNEP in the World Conservation Strategy (IUCN et al. 1980) – that the approach to conservation began to slowly but fundamentally change. The underlying idea espoused was that it was possible to harmonize the objectives of economic development and conservation through the choice of appropriate policies and market-based instruments. More specifically, it was recognized that the natural resource base was inextricably linked to the prospects of economic development, and that it was possible to achieve economic

development and conservation simultaneously by addressing the underlying causes of natural resource degradation.

With the advent of the Brundlandt Commission report in 1987 (WCED 1987), conservation approaches faced another apparent dilemma. For the first time at the global level, an inextricable link between poverty and environment was revealed and highlighted. The Brundlandt report states that:

"Poverty is a major cause and effect of global environmental problems"

"Many parts of the world are caught in a vicious downwards spiral: poor people are forced to overuse environmental resources to survive from day to day, and their impoverishment of their environment further impoverishes them, making their survival more difficult and uncertain" (WCED 1987; p. 3).

The Brundlandt report, while bringing to the forefront an important perceived relationship, nevertheless painted a pessimistic picture of poverty - environment interactions, reflecting the image of a vicious downward spiral of need. The orthodox conservation approach latched onto this relationship and accordingly advocated that demographic and economic changes were contributing to this process. The basic idea was that rapid change occurring in ecologically vulnerable urban or rural areas 'poverty reserves' had the greatest environmental implications. The solutions offered were directed at macroeconomic poverty eradication measures and the continuation of short-term land management or protection schemes excluding certain land uses while seeking to protect fragile ecosystems from encroachment by poor people.

Such top-down and exclusionary approaches to poverty reduction and environmental protection ultimately met severe criticism both for failing to meet local livelihood needs and failing to protect natural resources. The approach did not take proper account of the political economy of power and use of resources whereby the rich and powerful were able to use natural resources for unsustainable activities at very low rents thereby leading ecosystem declines which in turn pushed many social groups dependent on the ecosystems into poverty (Duraiappah 1998). The Rio Earth Summit in 1992 began a movement toward more localized, community-based approaches to natural resource management and sustainable development, a movement that was at least partially slowed by Indira Ghandi's infamous statement that poverty is the main driver of environmental degradation.

It can be argued that the emphasis on community-based approaches stemmed from a distinctively Southern conservation approach of what Guha (1989) calls the poor peoples' conservation movements. As exemplified by the famous Chipko movement in India, this approach sees the environment-poverty relationship running in the opposite direction, with environmental degradation seen as inimical to the prospects of socio-economic progress and poverty reduction. At the heart of this approach has been a political conception of environmental degradation, stemming from the unequal distribution of political and communicative power. As a result, the solution that is advocated is primarily in terms of empowerment and collective action.

As a result of the sustainable development ethos, the approach to conservation sees the simultaneous pursuit of economic prosperity, poverty reduction and environmental conservation to be not only possible but also necessary. Under this approach, two major strands are visible. One strand lays major emphasis on community-based approaches, which seek to create and strengthen institutions that can make the pursuit of economic prosperity, poverty reduction and conservation possible. The approach builds on some innovative work on poverty reduction that concentrates attention on the building of social capital among stakeholders (Putnam 2000). Behind this approach is an alternative conception of poverty that places central emphasis on uncertainty, vulnerability and shocks as well as the ability of poor people to adapt and cope to changes (Narayan et al. 2000). The second strand, as highlighted in article 11 of the Convention on Biological Diversity (CBD) calls upon the CBD parties to "*... as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity"* (http://www.biodiv.org/convention/articles.shtml?a=cbd-11)

Integrated conservation and development projects (ICDPs) emerged as an alternative to the fines and fences approach in the late 1970s. The Worldwide Fund for Nature (WWF) and World Bank supported ICDPs around the developing world. ICDPs were designed to simultaneously advance three goals of sustainable development: (i) more effective biodiversity conservation; (ii) increased community participation in conservation and development; and (iii) economic opportunities for the rural poor (Wells et al. 1999). However it is generally acknowledged that the results of increased conservation and economic development have been mixed (WWF 2000, 2001; Oates 1999). Some examples of successful community-based

conservation schemes have been noted across the developing world. On the whole, however, the schemes have often been difficult to sustain in financial terms and their conservation impact have rarely matched expectations because of the inability to decrease demand for ecosystem services.

The emerging lessons and motivations towards direct approaches to conservation point to the fact that ecosystem conservation requires a steady stream of financial resources that is adequate not just to cover the direct costs of ecosystem management, but also to offset the opportunity costs that conservation incurs at the local level. The opportunity costs incurred at the local level shape the economic incentives for the conservation effort. Unlike traditional conservation approaches, payment for environmental services therefore revolves around direct payment for services provided and received, rather than on a system of indirect benefits or 'conservation subsidies' which are injected from outside, and which have often proved unreliable or unsustainable over the long term (Ferraro and Kiss 2002).

3. The origins and development of market-based instruments for environmental policy

The theory behind market-based approaches to environmental policy was first developed in the 1960s by Dales (1968) and Crocker (1966). These economists proposed cap-and-trade systems to manage pollution in which limited amounts of rights to pollute or use natural resources would be distributed to stakeholders, then could be bought and sold. Firms with lower pollution abatement costs would be able to sell emission permits to firms with higher abatement costs. Compared to the blanket application of fixed standards, these flexible mechanisms would meet the same emission standards at lower total cost to the economy (Woodward 2005).

The US Environmental Protection Agency began to experiment with emission credits in 1974, allowing firms to earn credits by surpassing emission targets for CO, SO_2 and NOx in one part of their firm that could be applied to higher emissions in other parts of the same firm. The emission offset program began in 1977, for the first time allowing firms to trade emission credits with other firms and to bank credits for future use. These instruments were codified in the Emission Trading Programme in 1986. Greater impetus for the use of market-based

instruments came in 1988 when Senators Timothy Wirth and John Heinz led the environmental policy initiative, *Project 88: Harnessing Market Forces to Protect our Environment.* A number of other emission trading regimes were initiated in the United States in the 1980s and 1990s. By 2001, the United States Environmental Protection Agency was actively involved in the design or implementation of 35 emission trading projects across the United States. The largest and perhaps most successful emission trading regimes in the United States were the lead trading regime that gave gasoline manufacturers greatly flexibility in meeting lead content regulations, and the SO_2 allowance trading regime for acid rain control (Stavins 2000, 2002). It has been estimated that the SO_2 trading regime has resulted in average cost savings of US$1 billion per year, compared to the command-and-control approaches that were considered by the US Congress (Stavins 2005). In 2004 there were about 70 water quality trading initiatives in the United States (King 2005).

US schemes for Wetlands Mitigation Banking are an example of what is called 'biodiversity offsets'. Concerns over continued loss of wetlands led to the articulation of a national goal of no net loss of wetlands and the environmental services that they provide. The US Army Corps of Engineers requires that project developers who fill in wetlands mitigate their impacts as much as possible. If full mitigation is not possible, then the developers are able to offset damage to one wetland with the conservation or rehabilitation of another wetland. Single-user wetland mitigation allows project developers to bank up credits from wetland restoration in one area that can later be drawn upon to offset damage in other areas. Commercial wetland mitigation banks allow the development of a market in wetland restoration, with environmental consulting firms restoring wetlands and selling the wetland offsets to project developers as the need arises. Despite its obvious theoretical advantages, only about 10-20% of all wetland banking schemes take the form of commercial banks (Shabman and Scodari 2005). Operating in a broader variety of ecosystems and countries, the Business and Biodiversity Offset Programme (BBOP) encourages businesses that cause unavoidable damage to biodiversity to voluntarily offset those impacts by making corresponding investments in biodiversity conservation (www.forest-trends.org/biodiversityoffsetprogram/).

Until the late 1980s, environmental policy in Europe followed the standard command-and-control approach, with little harmonization between countries. The year 1992 marked a watershed in environmental policy in Europe, after which there has been considerable

experimentation with more flexible policy instruments. Jordan, Wurzel and Zito (2005) describe four types of New Environmental Policy Instruments (NEPIs) that have emerged over the last 15 years: (1) Market-based instruments, including eco-taxes, tradeable permit systems, subsidies and deposit-refund schemes; (2) eco-labels – including those that are externally-verified, unverified self-declaratory schemes, and single-issue schemes; (3) voluntary environmental management and business certification systems; and (4) voluntary agreements between industry and public authorities on the achievement of environmental objectives, including negotiated agreements, public voluntary schemes, and unilateral commitments.

A study of environmental policy in 7 European countries, the European Union as a whole, plus Australia, shows large variation in approach from jurisdiction to jurisdiction. Eco-taxes are most common in Finland and the Netherlands, tradable permits common only in the UK, voluntary agreements most common in Germany and the Netherlands, eco-labels most common in Germany and Finland, and environmental management systems common in Finland, Germany and Austria. Countries such as Finland, Germany, the Netherlands and Austria have been much more innovative in adopting New Environmental Policy Instruments than countries such as Ireland, France and Australia (Jordan et al. 2003, Table 1).

Table 1. The distribution of new policy instruments in 9 jurisdictions of Europe and Australia

	Eco-taxes	Permits	Agreements	Eco-labels	Systems
Finland	High	Low	Medium	High	High
Germany	Medium	Low	High	High	High
Netherlands	High	High	High	Low	Medium
Austria	Medium	Low	Medium	Medium	High
UK	Medium	High	Low/Medium	Low	Low/Medium
Ireland	Low	Low	Low/Medium	Low	Medium
European Union	Low	Low/Medium	Medium	Medium	Medium
France	Medium	Low	Low	Low	Low
Australia	Low	Low	Low	Low	Medium

Source: Jordan et. al. 2003.

Environmental policy in the developing world still relies primarily on command-and-control policy instruments, some of which are a legacy of colonial governance systems. For example, forestry policy in many parts of Africa and Asia is a hold-over of European forest laws that justified the exclusion of peasant farmers from large tracts of land on the basis of arguments about the environmental services of forest ecosystems. Harsh enforcement of soil and water

conservation laws by the colonial governments fueled resentment of the colonial governments. The post-colonial period was a time of resistance against the colonial laws, with significant conflict in countries such as Indonesia and weak enforcement in countries like Kenya. The Rio Summit of 1992 brought about a new phase of environmental regulation in many developing countries, with under-resourced Environmental Management Authorities still largely relying on command-and-control policies, despite the remaining challenges of enforcing such policies. The Rio environmental conventions on biodiversity, climate change and desertification mandated the parties to develop national-level laws and strategies consistent with the objectives of the conventions, with only one of those conventions, the UN Framework Convention on Climate Change (UNFCCC), providing the possibility for market-based policy instruments.

Di Leva (2002) describes 3 categories of market-based instruments that have made significant inroads in developing countries: (1) traditional revenue-raising measures adjusted to environmental concerns; (2) real property measures adjusted to conservation needs, such as conservation easements; and (3) protection through a variety of more recent legal instruments, such as carbon sequestration under the Kyoto Protocol and transferable quotas. Ecotourism is the main example of the first category of instruments, with up to 20 percent of tourism to the Asia / Pacific region being linked to nature holidays. Ecotourism can provide conservation incentives to rural communities in two ways, through the sharing of revenue generated from user fees with communities surrounding protected areas that attract tourists, and through community-owned or community-managed ecotourism facilities. The regional workshops for Latin America and Africa revealed that many countries in Latin America and Africa have accumulated significant experience with such mechanisms. In East and Southern Africa, there are a growing number of communities involved in ecotourism, contributing to the conservation of significant tracts of savannah grassland. The Community Conservancies of Namibia are perhaps the most obvious success story. Fees for bio-prospecting attracted a great deal of attention during the formulation of the Convention on Biological Diversity. While there are a few high profile bio-prospecting arrangements involving the payment of significant amounts of money by private firms, the overall amounts involved across the developing world remain miniscule.

Although attracting the greatest attention by analysts at the moment, there still are relatively few cases of self-organized deals in which the beneficiaries of environmental services pay ecosystem stewards to maintain the quality of environmental services. Since 1997, the City of New York has invested US$1.5 billion in conservation of the Catskills / Delaware catchment, which is the major source of water for the city. In exchange farmers, businesses and local governments in the catchment area have agreed to undertake a range of conservation activities and foregone development opportunities. Similar mechanisms are now in place in several locations in Latin America and Asia, and there is considerable interest in East and Southern Africa in instituting similar arrangements (see regional workshop reports for Latin America - ICRAF Working Paper no. 33, Africa - ICRAF Working Paper no. 35 and Asia - ICRAF Working Paper no. 34).

Utting (2005) notes that these various changes in the environmental policy environment over the last 20 years are part of an overall trend toward 're-regulation', where rolling back the role of the state and liberalization of markets have been accompanied by the strengthening of governmental and intergovernmental rules to protect, for example, certain types of property rights, international trade and investment, and the environment. Corporate Social Responsibility (CSR) has been increasingly important since the late 1990s, with companies increasingly being held accountable by non-governmental organizations and public-private partnerships, practicing so-called civil regulation or co-regulation. These 'collective' or more 'socialized' forms of private authority (O'Rourke 2003) are increasingly supported by governments and intergovernmental organizations. While most of this change in the corporate regulatory environment is occurring in Europe and North America, there are both positive and negative spillover effects to developing countries. For example, concern about the carbon emissions associated with air transport of flowers from Africa to Europe could jeopardize one of the few sources of foreign exchange and vibrant economic growth in Kenya (*Daily Nation*, Feb 18, 2007).

4. A conceptual model of compensation and reward for environmental services

4.1 Definitions and concepts

A variety of terms are used in the academic and empirical literature to describe new market instruments for environmental policy. Some analysts see the terms as describing distinct concepts, while other analysts use terms relatively inter-changeably. Motivated by the review presented in Section 3, this section seeks to clarify some of these key terms, structured around a simple conceptual framework.

Two important terms are environmental services and ecosystem services. *Environmental services* is a term widely commonly used in the engineering profession to refer to the professional services that engineers provide to mitigate environmental damage. The Environmental Services Association, for example, "*represents the UK's waste management and secondary resources industry",* http://www.esauk.org/, while Golder Associates is a large international consulting firm specializing in "*ground engineering and environmental services*". http://www.golder.com/ default.asp?PID =1&LID=1. However, in this paper we ascribe to the environmental economist's concept of environmental service as a positive benefit that people obtain from the environment. That is, an environmental service is generated when an economic activity in one place, controlled by one economic agent, has positive spillover effects on other consumers or producers, often in other places. The environmental services of good forest management, for example, are usually categorized into watershed protection, biodiversity conservation, atmospheric regulation (including greenhouse gas mitigation), and landscape beauty (e.g. Pagiola, Bishop and Landell-Mills, 2002). Analysts such as Scherr and McNeely (2003) and Daily, Ehrlich and Sánchez-Azofeifa (2001) have noted that human-dominated landscapes can also generate important levels of environmental services. The ASB Partnership for the Humid Forest Margins has shown that human-dominated landscapes in the humid tropics are associated with a wide range of environmental services, with multi-strata agroforestry systems generating much higher levels of environmental services than secondary forests or forest plantations, although clearly lower than primary forests (Tomich, Thomas and Van Noordwijk 2004).

The concept of *ecosystem services* has been in common use for some decades, developed and applied jointly by economists and ecologists. The concept remains somewhat elusive and, in some circles, controversial. In the year 2000, the Ecological Society of America produced a primer on ecosystem services that defined ecosystem services as "the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants" (http://www.actionbioscience.org/environment/ esa.html). This is the definition which is used by Wikipedia. It contrasts considerably with the definition used by the Millennium Ecosystem Assessment (MA) which defines an ecosystem as *a dynamic complex of plant, animal and microorganism communities and the nonliving environment acting as a functional unit* and ecosystem services as "… *the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefit*" (MA, Chapter 1, Conceptual Framework, p.27). The Millennium Ecosystem Assessment definition focuses on outputs, rather than processes, and it considers a much broader range of outputs, especially provisioning outputs, than does the Ecological Society of America definition. In this paper, we ascribe to the Millennium Ecosystem Assessment definition of ecosystem services, although we note that market-based instruments are generally much more effective for provisioning services than for regulating, supporting or cultural services. It is worth noting that the concept of ecosystem services is still controversial in discussions of environmental policy, with the concept basically rejected during recent discussions of the Conference of Parties to the Ramsar Convention and the delegates to the United Nations Forum on Forests. Table 2 presents a categorization of provisioning, regulating and cultural services, as well as the types of values that they represent. Supporting services underpin the other types of services.

Table 2. A typology of ecosystem services

Types of ecosystem service	Provisioning services reflect goods and services produced in the ecosystem	Regulating services result from the capacity of ecosystems to regulate climate, hydrological and bio-chemical cycles, earth surface processes, and a variety of biological processes	Cultural services relate to the benefits people obtain from ecosystems through recreation, cognitive development, relaxation, and spiritual reflection.
Specific ecosystem services	Food, fodder, fuel (wood and dung), timber, fibers, other raw materials, biochemical and medicinal resources, genetic resources, ornamentals	Carbon sequestration; climate regulation through regulation of albedo, temperature and rainfall patterns; regulation of the timing and volume of river and ground water flows; protection against floods by coastal or riparian systems; regulation of erosion and sedimentation; regulation of species reproduction (nursery function); breakdown of excess nutrients and pollution; pollination; regulation of pests and pathogens; protection against storms; protection against noise and dust; and biological nitrogen fixation	Nature and biodiversity (provision of a habitat for wild plant and animal species); provision of cultural, historical and religious heritage (e.g. a historical landscape or a sacred forests); provision of scientific and educational information; provision of opportunities for recreation and tourism; provision of attractive landscape features enhancing housing and living conditions (amenity service); provision of other information (e.g. cultural or artistic inspiration)
Types of value	Direct use value Option values	Indirect use values Option values	Direct use value Non-use values

Source: Hein et al. 2006 (based on Ehrlich and Ehrlich 1981; Costanza et al. 1997; De Groot et al. 2002; Millennium Ecosystem Assessment 2003.)

In practice, the main difference between ecosystem services and environmental services is the inclusion or exclusion of provisioning ecosystem services. Almost all provisioning ecosystem services – food, fiber, timber – are excludable and rivalrous, goods for which markets develop most readily. The focus in this paper is on non-provisioning services – especially regulatory and cultural services – for which markets do not easily develop because of high exclusion costs, non-rivalrous consumption, or significant externality effects.

In a 2005 publication, Sven Wunder noted that there was no agreed definition of 'payment for environmental service (PES)', despite its common use in the literature. He proposed the following definition, "*a voluntary, conditional transaction where at least one buyer pays at least one seller for maintaining or adopting sustainable land management practices that favour the provision of a well-defined environmental service*" (Wunder 2005). While this definition has been generally accepted by the international experts working on market-based instruments for environmental policy, it also is controversial. Wunder himself has shown that

the definition rules out most market-based instruments in use in the developing world, adopting *PES-like* as a more inclusive and flexible term in more recent publications.

In this project we do not challenge the Wunder definition of PES per se, but do doubt its usefulness for describing and analyzing the range of interesting and important mechanisms that are being negotiated for managing interactions between people with diverse interests in ecosystem management and ecosystem services. In particular, we note that the relationships between ecosystem stewards, environmental service beneficiaries and intermediaries may be more complex than a simple transaction, with agreements that are not wholly voluntary and payments that are not wholly conditional. Rather than offering an alternative definition of payments for environmental services, we develop a conceptual framework that illustrates different types of relationships between stewards, beneficiaries and intermediaries.[5] We suggest that the term *compensation and rewards for environmental services* (CRES) captures most relationships. Later in this section, we offer definitions for these terms.

4.2 Identification and characterization of actors in compensation and rewards for environmental services

We can identify three generic types of stakeholders or functional groups in compensation and rewards for environmental services: ecosystem stewards, environmental service beneficiaries, and intermediaries. While we tend to refer to these as distinct groups of people or agents operating within and dependent on an ecosystem, it is important to keep in mind that there may be ecosystem stewards, environmental service beneficiaries and intermediaries within the same village or family. Indeed, individual persons, communities or corporations may simultaneously be ecosystem service stewards/modifiers, beneficiaries and intermediaries.

An *ecosystem steward* is an entity (individual, family, group, community) whose actions modify the quantity or quality of ecosystem services available to environmental service beneficiaries. We call them stewards in this framework to recognize that such entities are recognized by society as having the right to interact closely with an ecosystem, provided that they accept certain limitations on those rights and certain obligations to maintain the

[5] This framework builds upon the framework presented in Tomich et al. 2004.

ecosystem. Experience shows that there are several important characteristics of ecosystem stewards and their relationships with the ecosystem and other actors:

a. Exclusion or inclusion criteria. What criteria are implicitly or explicitly used to define who is in and out of the different groups of ecosystem stewards (ethnicity, gender, ability to pay, residential location, political power)?
b. Type and strength of groups and other forms of social organization, including their social and political capital;
c. Nature of the cause-effect relationship between ecosystem stewards and the ecosystem. What technologies, land use practices or enterprises are associated with benign or destructive use of the ecosystem? What geographic locations within the ecosystem are particularly important for ecosystem structure and function and what are the threats and pressures on those locations? What technologies, land use practices or enterprises might be promoted or actively discouraged with the ecosystem stewards to better conserve or enhance the ecosystem? How fast or slow are the relationships – do they act over minutes, days or decades? Are the relationships relatively linear, non-linear or subject to thresholds?
d. Location vis-à-vis the ecosystem – e.g. upstream, midstream or downstream within a watershed; adjacent to or relatively distant from a protected area or wetland; located within or outside of an ecosystem;
e. Their rights and discretion over the way the ecosystem is used and managed and over the design of mechanisms that shape overall management and use of the ecosystem;
f. Their level of human well-being, poverty and deprivation – both in absolute terms and relative to other actors affecting the ecosystem;
g. Their demographic composition – in terms of gender, ethnicity, age and livelihood strategies;

Environmental service beneficiaries are entities (individuals, families, groups, corporations, towns, utility companies) who benefit from the environmental services generated by an ecosystem. Environmental service beneficiaries can be characterized by:

a. Types of environmental and other ecosystem services they benefit from – see Table 2 for the full list of ecosystem services;
b. Location – physical location within or outside of the ecosystem, within or outside of the administrative area or country where the ecosystem is located;
c. Degree and type of dependence on the environmental service – for subsistence or commercial exploitation;
d. Access to alternative supplies of the environmental services or good substitutes for those services – for example environmental service beneficiaries who rely only on the regulating service of Certified (carbon) Emission Reductions are likely to be able to draw upon a much wider range of alternative suppliers than those who rely on the environmental service of flood mitigation;
e. Level and trend in different dimensions of human well-being / deprivation;
f. Strength and type of property rights or entitlements to the environmental service;
g. Discretion over the way the ecosystem is used and managed;
h. Demographic composition – gender, ethnicity, age and occupation;
i. Type and strength of groups and other forms of social organization;
j. Their action resources [6] viz. the environmental services and their relations with others.

Intermediaries are entities (public authorities, non-governmental organizations, community- or faith-based organizations, projects) that directly or indirectly shape interactions among ecosystem stewards, environmental service beneficiaries, and the ecosystem itself. Ecosystem service intermediaries perform a variety of roles in compensation and rewards for environmental services, including providing information relevant to design, monitoring and evaluation of contracts and negotiated agreements, providing a forum for negotiations, enforcing the terms of regulations and contracts, and offsetting the transaction costs of establishing and maintaining a working mechanism. Intermediaries can be characterized by:

[6] Action resources include intangible and tangible assets that give actors the capability for agency – the ability to exercise choices, to participate in collective action at various levels, or to influence other actors' choices. All forms of assets – natural, physical, financial, human, and social capital – can be action resources (Ostrom 2007; Swallow et al. 2007).

a. Mandate, objectives and perspectives – The intermediaries currently involved in CRES mechanisms vary greatly in terms of mandate and objectives, from international conservation organizations, international and national research organizations, local governments, philanthropists, international development assistance organizations, state and local arms of government.
b. Representation – Some intermediaries act on behalf of ecosystem stewards, environmental service beneficiaries, or third parties with interest in the ecosystem or people living in the ecosystem;
c. Source of authority – international convention, national law or policy, customary laws, local practice, control over financial or physical resources, ownership or direct financial interest in resource use, influence over the behavior of other authorities;
d. Type of influence on the behavior of ecosystem stewards and environmental service beneficiaries – imposition and / or enforcement of regulations on resource use; subsidization of the costs of establishing or maintaining an environmental management regime; subsidization or provision of positive incentives.

4.3 Definition and typology of compensation and rewards for environmental services

Experts working on the area of payments and rewards for ecosystem services generally characterize the contracts and agreements by two criteria: a) the type of ecosystem or environmental service – usually landscape beauty, biodiversity conservation, watershed protection and carbon sequestration; and b) type of contractual arrangement – usually a) self-organized deals, b) open-trading schemes under cap-and-trade systems, c) payments made to ecosystem stewards by public agencies or philanthropic organizations, and d) ecolabelling or certification of products generated in ways that are consistent with good ecosystem stewardship (see e.g. Jenkins 2006). In this section of the paper we recognize the salience of this typification, but strengthen the focus on the different stakeholder groups and the type of behavior that the compensation or rewards attempts to modify or offset. Reference to the four types of contractual arrangement, and others, are made.

We define the term, Compensation and Rewards for Environmental Services (CRES) as follows: contractual arrangements and negotiated agreements among ecosystem stewards,

environmental service beneficiaries and / or intermediaries, for the purpose of enhancing, maintaining, re-allocating or offsetting damage to environmental services.

A particular CRES contract or negotiated agreement will include a compensation or reward instrument or combination of instruments. We thus need to define the terms *compensation for environmental services* (CES) and *rewards of environmental services (RES*):

Compensation for environmental services (CES) are payments or other forms of restitution made to economic service beneficiaries or ecosystem stewards to offset foregone entitlements to environmental services or ecosystem stewardship benefits.

Rewards of Environmental Services (RES) are inducements provided to ecosystem stewards to enhance or continue to maintain environmental services.

Further distinction among CRES mechanisms is useful to clarify the agents involved, the action that is being rewarded, and the nature of the contractual arrangement or negotiated agreement. We distinguish two types of compensation (CES1 and CES2) and two types of reward mechanisms (RES1 and RES2), as depicted graphically in Figure 1.

CES1 – Compensation to environmental service beneficiaries for socially-disappointing damage to environmental services by ecosystem stewards. CES1 includes self-organized deals between stewards and beneficiaries, restitution payments that are mandated or ordered by intermediary organizations, as well as compensation payments made by an intermediary organization. CES1 aligns with the principle of 'polluter pay'.

CES2 – Self-organized contracts, negotiated agreements or tradable allowance and permit systems that facilitate exchange of environmental service entitlements among environmental service beneficiaries. This includes cap-and-trade systems for emissions and conservation concessions.

RES1 – Rewards to ecosystem stewards for foregone stewardship rights or threat reduction. RES1 includes self-organized deals between ecosystem stewards and environmental service beneficiaries, public programmes of reward made on behalf of beneficiaries and eco-labeling and certification schemes for products generated through good stewardship practices. Examples include farmers being rewarded for not scaring migratory birds away from their crops. It would also include rewards to farmers who adopt zero-grazing for their cattle as a

substitute for grazing and watering cattle in riparian areas. And it would include the construction of a water point for a village to reduce use of a water point located inside of a biodiversity conservation area.

RES2 – Rewards to ecosystem stewards for undertaking extra investments or management practices that restore or enhance the ecosystem. This includes self-organized deals and public programmes of reward. This would include, for example, support to the planting of indigenous trees that provide greater habitat value for threatened birds.

Van Noordwijk et al. (this series) identify and discuss four key attributes of CRES mechanisms – realistic, conditional, voluntary and pro-poor.

4.4 Graphical depiction of the basic conceptual framework

Figure 1 is a graphical representation of the concepts presented in this section of the paper. The upper left bubbles represent the ecosystem – with ecosystem structure and function transformed by an ecological production function into ecosystem services. Environmental service beneficiaries benefit from environmental services, either directly or through some value or market chain. They may or may not interact with two other stakeholder groups: ecosystem stewards and intermediaries. Ecosystem stewards interact directly with the ecosystem, with three types of effects on the ecosystem: use or extraction of ecosystem resources; conservation and protection of the ecosystem; and investment and management to enhance the ecosystem. The solid lines joining the boxes show direct relationships. The four types of compensation and rewards for ecosystem services are indicated, with dashed lines showing transfers of resources.

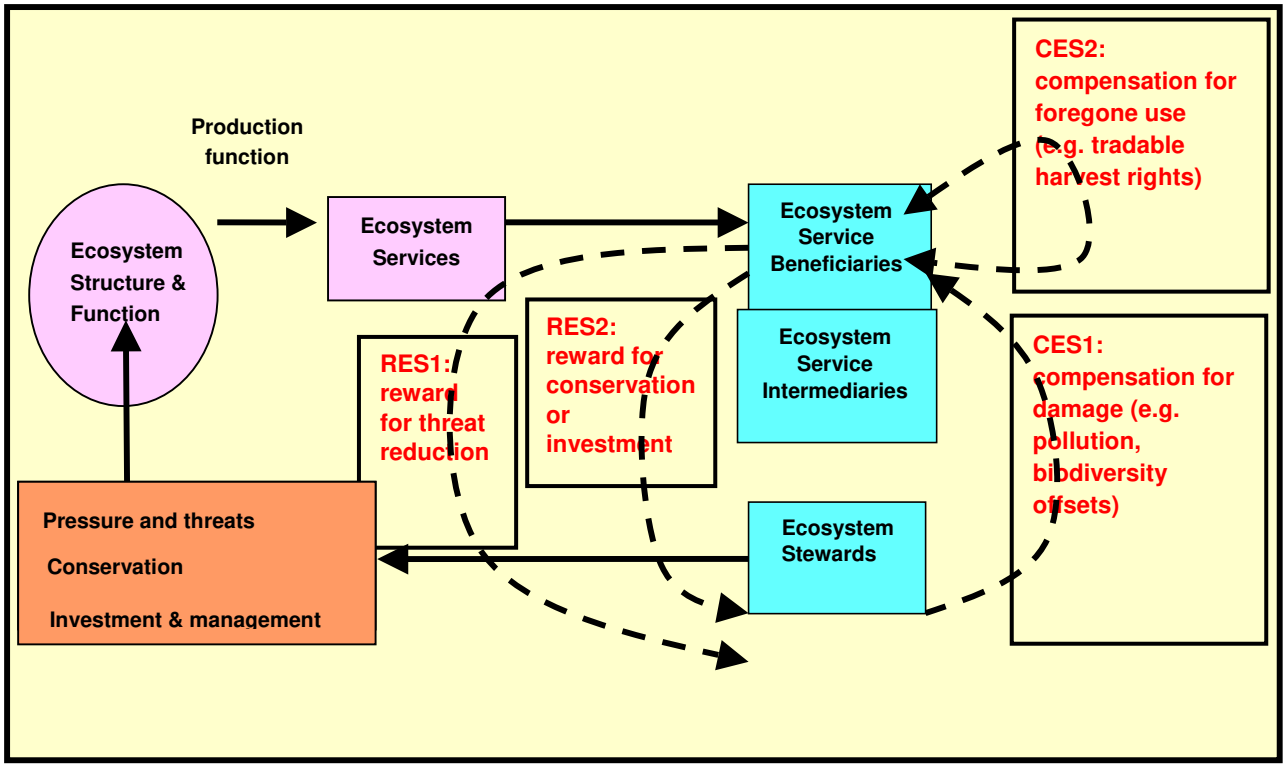

Figure 1. Illustration of key concepts and types of compensation and rewards for environmental services.

4.5 Characterization of mechanisms for compensation and rewards for environmental services

Experience shows that mechanisms of compensation and rewards for environmental services can be characterized in several respects in addition to the stakeholder characteristics discussed in Section 4.2 and the typology presented in section 4.3. These characteristics affect the performance of the mechanism in terms of ecosystem management and impacts on poverty and human well-being.

Relationships among ecosystem stewards, environmental service beneficiaries and intermediaries. What is the nature of previous and confounding relations between ecosystem stewards, environmental service beneficiaries, and intermediaries? Are there any lingering conflicts that hamper fair negotiation and enforcement? Is the mechanism the only contractual or negotiated relationship among the parties, or is this part of a multi-stranded social, economic and / or political relationship? Do the other strands hamper or hinder the likelihood of success of a new agreement?

Characteristics of the mechanisms:

a. Nature of the contract or agreement among the stakeholder groups. Are there individual or group contracts, enforcement agency (statutory or customary authorities?)
b. Transaction costs of establishing and operating the mechanism, including information, contracting and enforcement; distribution of those transaction costs;
c. Type of remuneration or incentives provided as compensation or rewards. Is there quid pro quo exchange of money for divisible, excludable goods, as normally is the case for provisioning goods? Are more secure property rights, public services or extension services explicit or implicit components of the contract or agreement?
d. What market-based instruments are used? Market-based instruments are tangible pieces of evidence of environmental services that are issued or certified by some public or private authority and backed by the reputation or legal sanction held by that authority. Market-based instruments for environmental services have been created to encourage private-sector enterprises to internalize the environmental externalities of their actions. Trade in those market-based instruments is intended to increase the efficiency in the way that environmental costs are born by the overall economy. Examples of market-based instruments include Certified Emission Reductions (backed by the Executive Board of the Clean Development Mechanism and certified by reputable private firms) and wetland credits backed by the US Army Corps of Engineers and United States Wetland Mitigation Banking Program (see http.ecosystemmarketplace.com).
e. Temporal pattern of payment. Is the payment a recurrent payment to offset the opportunity costs of lower returns or a lump sum which is assumed to facilitate ecosystem stewards to make the investments necessary to surpass some type of threshold?

4.6 Characterization of the external environment and drivers

Figure 1 illustrates the relationships between different functional groups and ecosystems services within an ecosystem. Figure 2 recognizes that these interactions occur within a broader social and environmental context. Different driving forces – social, economic and environmental – act upon the system in this larger context.

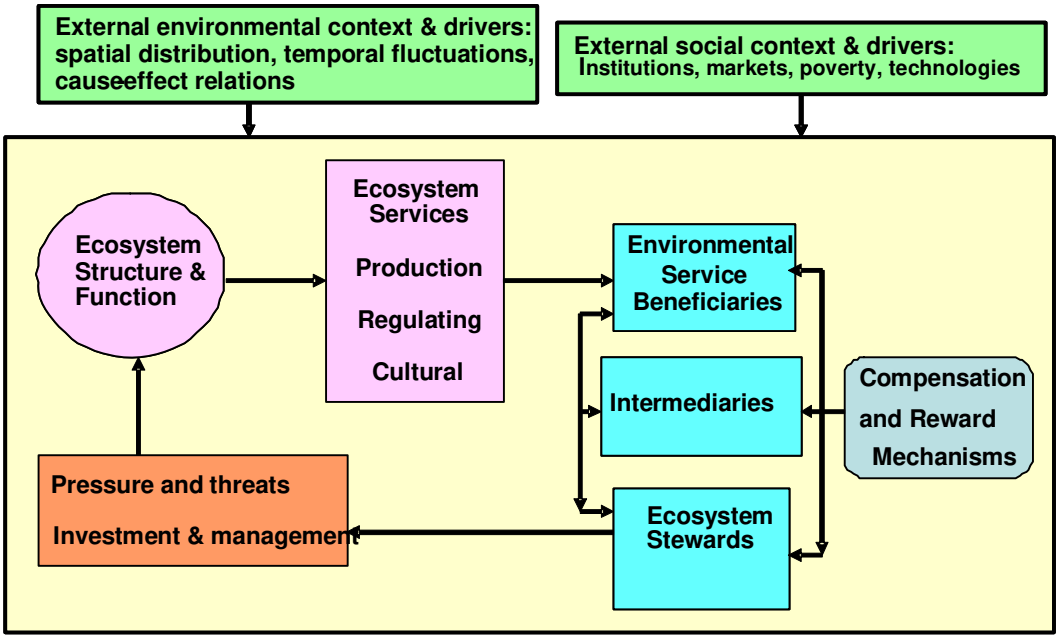

Figure 2. Illustration of the external factors shaping compensation and rewards for environmental services.

International political and economic environment – Multilateral environmental agreements, international development assistance flows, foreign direct investment, expectations of corporate social responsibility.

Climate conditions – Short and long-duration climate events, including extreme rainfall events, El Niño events and global warming.

National political and economic environment – Policies, strategies and regulations affecting the environment, water, governance and property rights. ICRAF Working Papers 38 and 39 in this series explores the importance of internal and external conditions in determining the effectiveness of CRES mechansims.

5. Public policy context, expectations and compensation and rewards for environmental services

An issue that was repeatedly stressed in the regional workshops and other public presentations of the results of this scoping study was the context of public policy and social expectations within which contracts and negotiated agreements are worked out. Several interesting lines of argument emerged.

In some national contexts, particularly India, it was repeatedly stressed that the government has responsibility for ecosystem management in the country. Following this line of argument, the government is the trustee of ecosystem management on behalf of the people, if there is degradation of ecosystems and environmental services; it is because the government has failed to adequately discharge its responsibilities as trustee. Emphasis should be placed on strengthening the trusteeship role of government or devolving those roles to different tiers of government or user groups. While this argument was presented most clearly in India, it likely would hold sway in any context of strong state control of the economy and the natural resource base. However, experience from around the developing world shows that certain types of compensation and reward mechanisms may be perfectly well aligned with this trusteeship role, especially the large state systems of payment in South Africa (Working for Water), China and Meso-America. Self-organized deals and eco-labelling arrangements may play less of a role in such situations.

In other national contexts, particularly in East Africa and the Andes, there were arguments about the problems of "*paying people to obey the law"*. That is, a number of fairly strict national laws and regulations are in place, but are generally disregarded by ecosystem stewards and poorly enforced by intermediaries. Mechanisms of reward for environmental services have the potential to reward people for simply doing what they should be doing anyway. Some of the agencies involved as intermediaries in these mechanisms stressed that they make sure that their mechanisms are fully consistent with the law, sometimes employing deliberate language to ensure that compliance. The Wildlife Consolation Programme in the Kitengala Plains of Kenya deliberately uses the word 'consolation' to describe their payments for loss of livestock due to predators, since the Kenya Wildlife Act does not allow for 'compensation' for damage caused by wildlife. Other agencies involved as intermediaries indicated that they did not pay full attention to the dictates of formal law, but rather considered the local social norms of behaviour. If the local norm was to cultivate steep hillsides in water catchment areas, then farmers should be rewarded to forego that practice, even if there is an unenforced national law that prohibits the practice.

At a recent workshop on bylaws for natural resource management, two alternative lines of argument emerged regarding social expectations and public policies affecting natural resource management. In countries that have embraced decentralized forms of government, such as

Uganda and Tanzania, local authorities have a stronger mandate to develop new bylaws that respond to local needs and are consistent with local expectations. It can be argued that such bylaws establish the norms of behaviour versus compensation and rewards for environmental services. In those countries, and most others in Africa, it was noted that many of the laws with influence on land use and ecosystem management are framework laws that define policy objectives and new organizations (e.g. Water Users' Associations and the Water Resource Management Authorities in Kenya's Water Act of 2002), but leave specific regulations to more decentralized processes and organizations. In that case, new mechanisms for compensation and reward for environmental services may provide important test cases and case law for defining expectations.

Another line of argument that emerged through the regional workshops was that experience with new mechanisms of compensation and reward for environmental services may actually prompt changes in social expectations of acceptable behaviour. This adaptive learning role of compensation and reward for environmental services may be deliberately built into the mechanism design – as in the first commitment period of the Kyoto Protocol, or an inadvertent product of the process.

Overall, what emerges is the need to carefully consider compensation and rewards for environmental services versus minimum acceptable behaviour, using compensation mechanisms to try to punish those who fail to comply with minimally acceptable behaviour, the standard set of regulations and social norms to encourage continuation of minimally acceptable behaviour, and rewards to encourage behaviour which is recognized as particularly good for ecosystem function and services. These types of behaviour are indicated in Figure 3 using the analogy of the traffic light. Red light behaviour fails to meet minimum social expectations and thus should be punished in the form of fines and / or compensation payments. Compensation payments are designed to prompt beneficiaries to move toward amber light, socially-acceptable, behaviour. Amber light behaviour is consistent with social expectations. And green light behaviour exceeds social expectations by enough to warrant particular reward. Rewards should be sufficient to prompt ecosystem stewards to adopt such land uses. The trend lines indicated in the third column of Figure 3 indicate the possible trends in social expectations over time as resource conditions change and compensation and reward mechanisms are put in place.

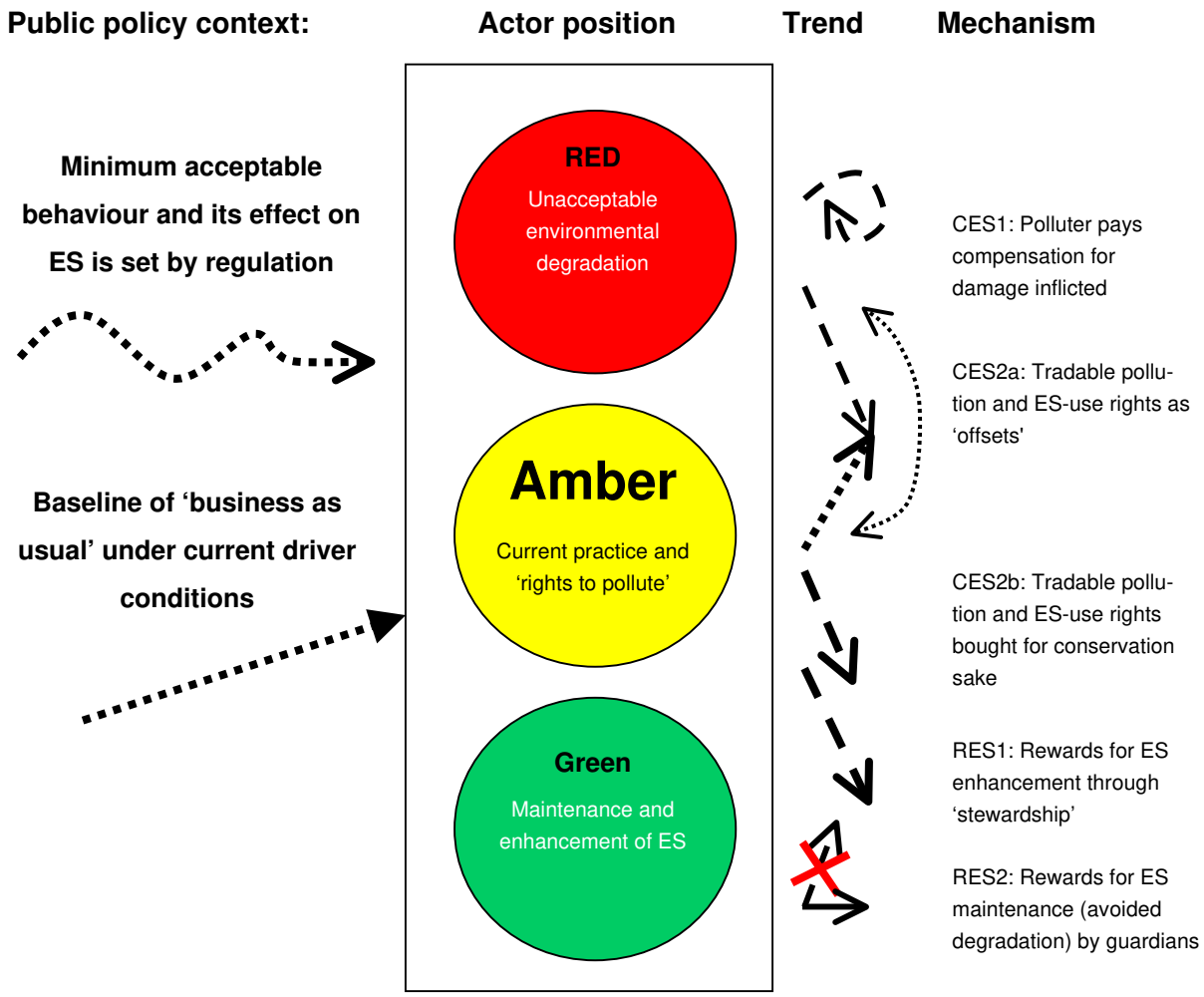

Figure 3. Public policy and social expectations context for compensation and rewards for environmental services.

Hatfield-Dobbs (2006) discusses the dynamic relationship between voluntary compensation and rewards, social expectations, and regulations. Figure 4 depicts a stylized situation in which community preferences for good environmental management increase over time, leaving a gap between what is generally desired and what is required by existing policy and regulation. This gap is similar to the yellow light zone depicted in Figure 3. Compensation and rewards for voluntary action can help to fill in this gap, with the gap narrowing over time as new mandatory standards come into force.

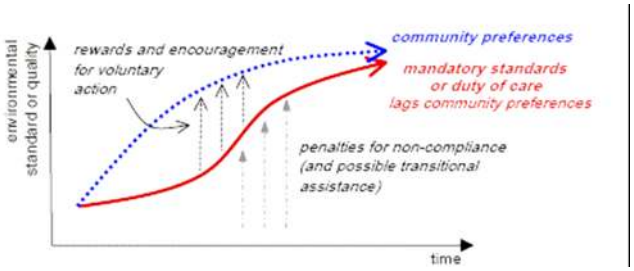

Figure 4. Contrasting perspectives on who should pay: phased polluter pays approach (favouring environmental and fiscal interests). Source: Hatfield-Dobbs 2006, adapted from Young et al. (2003).

Hatfield-Dobbs proposes that this dynamic situation will only hold if there is a strong polluter pays principal underlying the environmental policy. If, on the other hand, there is a voluntary beneficiary pays principle underlying policy, which favours resource user interests, then the mandatory standards or duty of care may change very gradually, increasing the space for voluntary reward mechanisms over time. This situation is depicted in Figure 5.

Figure 5. Contrasting perspectives on who should pay: voluntary beneficiary pays approach (favouring environmental and resource user interests). Source: Hatfield-Dobbs, 2006.

6. Overview of CRES mechanisms and perspectives

In this section we attempt to sum up current experience and perspectives on CRES in developing countries. Table 3 presents a summary of twelve prototype reward mechanisms that are observed in developing countries, particularly in Asia where the RUPES project is implemented. The first six mechanisms are generally grouped under the heading of watershed services, with the relative demand for specific services varying from place to place. Prototype mechanisms 7 and 8 focus on biodiversity conservation, 9 and 10 focus on sequestration and conservation of carbon stocks, and 11 and 12 focus on overall environmental standards and landscape beauty. Column 1 summarizes the environmental service; column 2 presents information on the providers of the environmental services and the services that they can

potentially sell; column 3 presents similar information on the users of the environmental services and the factors affecting their willingness to pay; and column 4 presents information on main issues that hamper or hinder the development or operation of those RES mechanisms.

Table 3: Environmental service reward prototypes

Environmental service	**Providers/ sellers**	**Users / buyers**	**Main issue**
1. Total water yield for hydroelectricity via storage lake	Impacts on total water yield small; reservoir sedimentation issue may dominate the debate; option for sediment traps and landscape filters	Consumer satisfaction depends on continued functioning; high project investment costs, little subsequent management flexibility	Intercepting sediment flows rather than avoiding them is generally easier to accomplish; sediment flows out of well-managed upper catchments may still be high because of geological and geo-morphological processes
2. Regular water supply for hydro-electricity via run-off-the-river	A change from soil quick flow (saturated forest soils) to overland flow will have some effect on buffering of river flows and hydroelectric operation time	Consumer satisfaction depends on continued functioning; high project investment costs, little subsequent management flexibility	Interventions influencing the speed of drainage (linked to paths, roads and drains) have the most direct effect on buffering at larger scales
3. Drinking water provision (surface or groundwater)	Intensive agriculture and horticulture will cause rapid pollution of surface flows and slow but persistent pollution of groundwater flows with nitrogen and pesticides; people residing around streams cause pollution *E.coli* and diseases	Willingness to pay for drinking water depends on quality assurance from medical perspective, as well as taste	Slow response of groundwater flows to changes in the pollutant status make 'regulation' a more effective solution than results based markets
4. Flood prevention	Land-use effects strongest for flow buffering of small-to-medium sized events, with saturation dominating the large events	Relevance of upland land use depends on location ('floodplains') and engi-neering solutions (dykes, storage reservoirs)	Risk avoidance for the rare category of large events
5. Landslide prevention	Mortality of deep-rooted trees ('anchors') causes temporary increase in landslide risk	Relevance depends strongly on location in the flow paths	Deep landslides are little affected by land cover
6. General watershed rehabilitation and erosion control	Promoting tree cover and permanence of litter layer protecting the soil is a good precaution	'Holistic' perception of watershed functions survives despite the lack of clear impacts on specifics	Communication gap with scientists who try to enhance clarity
7. Biodiversity buffer zones around protected area	Use value of buffer zones depend on hunting restrictions, presence of human-life threatening species	Flagship species still dominate the public perception of value	Push and pull factors in human land use; livelihoods operate at larger scales than most conservation plans acknowledge

Environmental service	Providers/ sellers	Users / buyers	Main issue
8. Biodiversity landscape corridor	Still new concept in agriculture/forest land use mosaics in the tropics; use value of patches in the 'stepping stones' similar to the buffer zone case	Relevance depends on dispersion properties of the species of main interest; sometimes higher connectivity not desirable; relevance in-creases with climate change concerns	Ex ante impact assessment of effectiveness is still difficult
9. Restoring carbon to degraded landscapes	Options for profitable tree restocking primarily depend on policy reform	Demand is for Certified Emission Reductions (CER) rather than carbon	Additionality issues in the Clean Development Mechanism; high transaction cost
10. Protecting soil and tree stocks of carbon	Road construction (accessibility) is main determinant of 'opportunity costs' for non-conversion	Demand is for Certified Emission Reductions (CER) rather than carbon	Not recognized as part of the Clean Development Mechanism
11. Guaranteeing production landscapes meet environmental standards	Where the 'ecolabel' process starts from the consumer side, there can be a substantial gap in communication and trust, leading to high transaction costs	Consumers with high sense of personal responsibility; gradually replaced by the introduction of standards and the raising of baselines of 'acceptable' behaviour	Relevance of global standards in the face of variation in local conditions; transparency of the standards and compliance monitoring; transaction costs
12. Providing guided access to landscapes of beauty/ heritage/ recreational value	The local and international appreciation for landscape beauty depends on culture and time (fashion); rewards are for roles as guide and providers of accommodation, food, transport 7 handicrafts; gender aspects of provider roles may be prominent	The appreciation of landscape beauty and cultural traditions does not reduce the need to provide security and comfort to potential tourists	Global ecotourism is a highly volatile market where security and political concerns can interfere

Source: Authors' summary of experience, personal observations and review of the literature on RES mechanisms in developing countries

From the international literature, and particularly from the discussions held at international conferences and workshops on CRES, it is possible to discern distinct perceptions of CRES mechanisms among analysts, donors and other stakeholders. The following paragraphs present our characterization of these different perceptions. We draw special attention to cases that were presented at the regional workshops.

Wildlife conservation perspective. CRES is mostly viewed as a source of conservation finance that may or may not complement or replace public funding and entry fees. Compensation mechanisms, such as the consolation mechanism instituted around Nairobi Park in Kenya, are

used to compensate farmers for damage to livestock and crops caused by wildlife. Reward mechanisms, such as the wildlife lease program also operating around Nairobi Park, may provide land owners with additional incentive to maintain wildlife corridors (see Ochieng, Otiende and Rumley 2007). Among the wildlife conservation community, there continues to be significant skepticism about the potential for CRES mechanisms, especially mechanisms such as the Clean Development Mechanism that may result in trading water and biodiversity for carbon.

Environmental management perspective. CRES may be mostly viewed as a way to provide positive incentives for good environmental stewardship to go along with the standard set of environmental regulations. As discussed in the literature review above, the movement toward CRES in the developing world is part of a more general global trend toward negotiation and softer environmental regulation. Many of the participants in the regional workshops expressed interest in CRES mechanisms for resolving conflicts over resource access and benefit sharing.

Poverty reduction perspective. CRES may be mostly viewed as a possible alternative income stream for poor people, that is, a new way to 'put money in farmers' pockets'. This emerged as a dominant perspective at the African regional workshop. At the Latin America and Asia regional workshops, on the other hand, many participants expressed concerns that CRES mechanisms, particularly carbon finance mechanisms, might also dispossess indigenous and poor people. This perspective has been strongly expressed in media reports of carbon sequestration projects in Uganda and in statements by indigenous people's groups in Latin America (see Poats 2007). Indeed the RUPES project in SE Asia was distinctly designed to explore the potential for pro-poor mechanisms (www.worldagroforestrycentre.org/sea/networks/rupes).

Economic planning perspective. CRES may be mostly viewed as a flexible and efficient way of correcting market failures and collective action problems. The papers by Ferraro and Kiss (2002) and Pagiola et al. (2002, 2004) express this perspective.

Rural empowerment and social equity perspective. CRES may be mostly viewed as a way to redress historical imbalances in the power, rights and responsibilities of resource-dependent people vis-a-vis environmental service beneficiaries who often enjoy greater influence over the political and economic processes. This perspective is particularly evident in the RUPES

programme in SE Asia. From a peace and justice perspective, compensation for environment services may be viewed as a mechanism for managing conflicts over resource use or benefit sharing.

Business perspectives. There appear to be multiple business perspectives on CRES: a) redressing environmental damage caused by business operations as a legal or ethical imperative; b) a component of a corporate social responsibility strategy designed to maintain or enhance the reputation of the business; c) complying with current or likely future environmental regulations; or d) sustaining or improving crucial environmental services that are inputs into business operations. Recent publications by Waage et al. (2007), Roberts and Waage (2007) and Earthwatch Institute et al. (2006) summarize information on these multiple motivations of business. Compliance with current environmental regulations – particularly in the European Union Emission Trading Scheme – is the major factor driving the interests of European business interests in the carbon trade. Compliance with likely future environmental regulations is driving U.S. business interests in the Voluntary Carbon Market.

Farmers and ecosystem stewards. The people who live within key ecosystems may also see CRES from several perspectives: a) official recognition of their rights to reside in, use and modify a protected ecosystem; b) a new government program that provides public services in exchange for formation of groups and / or planting trees; c) a new source of revenue for performing a defined service; or d) a new way for governments and powerful interest groups to dispossess people from their land. ICRAF and Lampung University have recently conducted a conjoint analysis study of farmers' preferences over the elements of conditional social forestry contracts in Sumatra and found that farmers place highest weight on recognition of their rights and some of the public services that they relate with the social forestry contracts.

Environmental service beneficiaries seeking redress for environmental damage caused by others may see compensation for environmental services as one of several ways to redress past grievances. Voluntary compensation payments, negotiated outside of the legal system, may prove to be more effective than legally enforced payments.

7. Conclusions

Previous sections of this paper have reviewed the concepts and provided an overview of recent historical development of conservation and environmental policy across the globe. Conservation organizations have become increasingly interested in the possibility of using compensation and rewards for environmental services (CRES) as a way to make more efficient use of available funds and for sustaining conservation outcomes over the long term. At the same time, the policy, regulatory and business environments within developing countries are generally becoming more conducive to CRES mechanisms. Adding to this situation, there is increasing interest in CRES mechanisms by a variety of other agencies, including United Nations organizations, development donors, and non-governmental organizations. Explicitly or implicitly, these various organizations have different perspectives on CRES: wildlife conservation, environmental management, poverty reduction, economic planning, rural empowerment, business, ecosystem steward, or ecosystem beneficiary seeking redress.

The situation unfolding in the developing world should be seen as part of a global trend toward more flexible, market-oriented and consensus-based environmental policy. As governments are becoming less involved in the strict enforcement of hard environmental regulations, non-governmental organizations, international organizations, and civil society organizations are becoming more involved in exerting pressure on companies to adopt good business practices toward the environment. Among the countries of Europe and North America, the portfolio of environmental policy instruments varies considerably from country to country, and industry to industry, with regulations still forming the backbone of environmental management in all countries. We should similarly expect that systems of compensation and reward for environmental services will vary from country-to-country and case-to-case across the developing world.

The overall experience with soft and market-based environmental policy instruments suggests that interest in compensation and reward for environmental policy will emerge for different reasons in different contexts:

a. In a pro-growth policy environment, market-based schemes may be used to reduce the economic impact of tightening environmental regulation by allowing companies and industries flexibility in the way they adjust to environmental regulations. This is the

primary justification for the emission trading regimes in the United States and a major motivation for the Clean Development Mechanism of the Kyoto Protocol. While many developing countries are engaging in the Clean Development Mechanism, there is little evidence of market-based schemes emerging spontaneously in developing countries.

b. In an environment where governments lack the political will or credibility to enforce new environmental regulations on powerful rural interests, they may use public compensation and rewards for environmental services as an extra enticement for adhering to legal or social expectations of behavior. This appears to be in the case in some of the Latin American countries that have been the biggest adopters of these mechanisms (e.g. Costa Rica, Mexico, see Poats, 2007).
c. In an environment where there are public funds available for rural poverty reduction and environmental management, public compensation and reward mechanisms may be seen as a convenient way to advance both objectives. This appears to be the case in the 'Pagos por Servicios Ambientales Hidrologicos' project in Mexico (see Poats 2007) and the Working for Water Programme in South Africa (see Ochieng, Otiende and Rumley 2007). This type of environment may hold greatest prospect for joining up environmental management and poverty reduction.
d. In an environment where there has been liberalization and restructuring of public services for water supply and electricity generation, there may be major new openings for business managers to meet their business objectives in new ways. The interests of the Nairobi City Water and Sewerage Company or the Quito Water Company in payments for watershed service mechanisms may be largely due to changes in water management institutions in the two countries.
e. In a situation where new environmental problems are coming to the notice of regulatory agencies and the general public, private businesses may see compensation and reward mechanisms as way to forestall or anticipate new environmental regulations. This appears to be the situation of the companies that have been willing to invest in voluntary carbon markets (Bayon, Hawn and Hamilton 2006).
f. In a situation of growing consumer wealth and global awareness, there will be an increase in the number of consumers willing to pay price premiums for products that are produced in an environmentally-sustainable manner. Eco-labelling programmes can therefore offer environmentally-aware consumers with new ways to express differentiated demands /

awareness for the benefits of fair trade and sustainable production (green labelling and fair trade). Experience with eco-labelling schemes to date, however, indicates that there is a potential for these schemes to be biased against smallscale farmers in developing countries (Gallastegui 2002).

g. In a situation of historical conflict over the use of natural resources, governments, communities and other interested parties may see CRES mechanisms as new ways to resolve conflicts without 'giving in'. This may explain, for example, the interest in conditional social forestry contracts in Indonesia.

h. Other papers in this series will address some of these issues in more detail. The paper by Iftikhar et al. (ICRAF Working Paper no.36) considers the links between CRES and human well-being in more detail, drawing upon recent understanding of the multi-dimensional nature of human well-being and the links to ecosystem services. The paper by Van Noordwijk et al. (ICRAF Working Paper no.37) presents a discussion of the criteria that should be used to assess CRES mechanisms in developing countries – realistic, conditional, voluntary and pro-poor – as well as some indicators of those criteria. Swallow et al. (ICRAF Working Paper no.38) pick up many issues from this introductory paper in an analysis of the conditions in which CRES mechanisms are most likely to be effective. Bracer et al. (ICRAF Working Paper no.39) focus on the governance and CRES mechanisms, with some special focus on community involvement. The final paper by Scherr et al. (ICRAF Working Paper no.40) presents a more thorough review of the current status of CRES mechanisms, a forward-looking analysis of the likely evolution of the different types of mechanisms over the next 20 years, and an analysis of the mechanisms with greatest potential to benefit the poor in developing countries.

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30. Etat de la Recherche Agroforestière au Rwanda Etude bibliographique, période 1987-2003.
31. Science and Technological Innovations for Improving Soil fertility and Management in Africa.
32. Compensation and Rewards for Environmental Services in the Developing World: Framing Pan-Tropical Analysis and Comparison.
33. Report on the Latin American Regional Workshop on Compensation for Environmental Services and Poverty Alleviation in Latin America.
34. Asia Regional Workshop on Compensation for Ecosystems Services. A component of the global scoping study on compensation for ecosystem services.
35. African Regional Workshop on Compensation for Ecosystem Services (CES)
36. Exploring the inter-linkages among and between Compensation and Rewards for Ecosystem Services (CRES) and human well-being: CES Scoping Study Issue Paper no. 1.
37. Criteria and indicators for environmental service compensation and reward mechanisms: realistic, voluntary, conditional and pro-poor: CES Scoping Study Issue Paper no. 2.
38. The conditions for effective mechanisms of Compensation and Rewards for Environmental Services (CRES): CES Scoping Study Issue Paper no. 3.
39. Organization and governance for fostering pro-poor Compensation for Environmental Services: CES Scoping Study Issue Paper no. 4
40. How important will different types of Compensation and Reward Mechanisms be in shaping poverty & ecosystem services across Africa, Asia & Latin America over the next two decades? CES Scoping Study Issue Paper no. 5.

Who we are

The World Agroforestry Centre is the international leader in the science and practice of integrating 'working trees' on small farms and in rural landscapes. We have invigorated the ancient practice of growing trees on farms, using innovative science for development to transform lives and landscapes.

Our vision

Our Vision is an 'Agroforestry Transformation' in the developing world resulting in a massive increase in the use of working trees on working landscapes by smallholder rural households that helps ensure security in food, nutrition, income, health, shelter and energy and a regenerated environment.

Our mission

Our mission is to advance the science and practice of agroforestry to help realize an 'Agroforestry Transformation' throughout the developing world.

United Nations Avenue, Gigiri - PO Box 30677 - 00100 Nairobi, Kenya
Tel: +254 20 7224000 or via USA +1 650 833 6645
Fax: +254 20 7224001 or via USA +1 650 833 6646
www.worldagroforestry.org