VITAL GRAPHICS

ON PAYMENT FOR ECOSYSTEM SERVICES

Realising Nature's Value

GRID ARENDAL

Vital Graphics on Payment for Ecosystem Services
Realising Nature's Value

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GRID-Arendal is an official UNEP centre located in Southern Norway. GRID-Arendal's mission is to provide environmental information, communications and capacity building services for information management and assessment. The centre's core focus is to facilitate free access to and exchange of information to support decision-making and secure a sustainable future. *www.grida.no*

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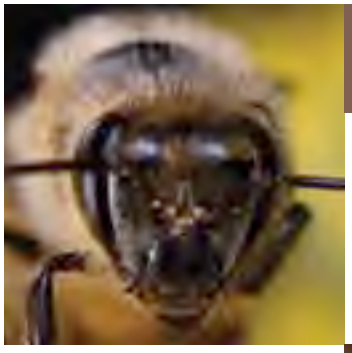


Central Panama Fungi

TABLE OF CONTENTS

Barro Colrado Island, Panama
More than 90% of tropical rainforest plants, like this collection from the forest of Barro Colorado Island in Panama, are pollinated by animals. The most important groups of pollinators are birds, insects and mammals.

OBJECTIVES OF THE VITAL GRAPHICS ON PAYMENT OF ECOSYSTEM SERVICES

■ This publication highlights the concept and selected market segments relating to payments for ecosystem services. It emphasises the role natural capital can play in both environmental conservation and in poverty alleviation, and highlights the potential benefits of ecosystem-based economic development in an accessible, non-technical manner.

■ Through its highly visual communications approach, GRID-Arendal aims to improve the understanding of PES and contribute to a general shift towards greener forms of economic development.

■ GRID-Arendal hopes this publication will be helpful for policy advisors and civil society representatives (non-government and community-based organisations, local business) working with community-based projects providing training in relation to ecosystem services.

INTRODUCTION

'AN ECOSYSTEM IS a dynamic complex of plants, animals, micro-organisms and their non-living environment, of which people are an integral part. The benefits that we derive from nature and rely on every day, from timber and food to water and climate regulation, are all ecosystem services', IUCN Commission for Ecosystem Management (IUCN-CEM).

Human life and activity depend directly on the health of ecosystems and the services they provide. For urban dwellers these services may seem remote, often taken for granted in day-to-day life. For rural populations, ecosystem services yield more visible benefits while for the poor in rural areas they often represent a vital lifeline for subsistence. In fact, ecosystem services form the basis of all life on planet Earth and are fundamental to human well-being.

In this publication we look at the 23 ecosystem services as described by the World Resources Institute (2011) and the United Nations Millennium Ecosystem Assessment (MA, 2005). Five specific market segments relating to Payment for Ecosystem Services (PES) – carbon sequestration, watershed management, biodiversity, landscape beauty, and bundled services – are illustrated, drawing on case studies, graphics and photographs. An additional section explores the role PES could play in alleviating poverty.

Ecosystems Under Threat

As the global population expands and uses up resources at an ever increasing rate, the planet's ecosystems continue to degrade and lose biodiversity, ecosystem resilience and natural capital.

In 2005 the Millennium Ecosystem Assessment identified 15 services provided by ecosystems around the world as having been degraded or used unsustainably over the past 50 years. The root causes of this trend can be seen in our inability to fully to recognize the services ecosystems provide, and our failure to understand that our well-being depends on living in balance with nature. But awareness of the importance of ecosystem services is growing and new mechanisms are now being put in place to facilitate payment for such services.

From Ecosystem Services to Economic Value

Nature provides ecosystem services to both humankind and to individuals, free of cost. However, conserving ecosystem services may come at a cost through the loss of revenue derived from another use. In particular these costs are incurred by individuals who own ecosystems such as, for example, a forest in a river catchment area. Conserving the forest provides a range of services, whether it means the supply of clean water or the prevention of soil erosion. But these services are largely unrecognized or 'invisible' values. On the other hand, converting the forest to cropland would provide direct benefits to the landowner and beyond. These benefits may be smaller than the costs of losing the ecosystem services; but they are more visible and positively accounted for in prevailing economic models. Further, the individual landowner derives relatively little benefit from conserving the services. PES can be a mechanism for overcoming this problem. In this publication we have worked with a broad understanding of PES in the sense that we have sought examples which illustrate the use of different systems of economic valuation for specific ecosystem services contributing to conservation.

Exploring Payment for Ecosystem Services

PES can be applied to the full range of ecosystem services. The primary objective of a PES scheme is not to generate money but to recognise the value of ecosystem services and support their sustainable use. PES schemes incentivise 'sellers', or 'service providers' to change behaviour and encourage them to continue to provide the services, usually by compensating for losses or 'opportunity costs.' The 'buyer', or 'service beneficiary', may be private (a company selling bottled drinking water), public (a city supplying drinking water) or other organisations, such as an environmental group involved in the conservation of forest biodiversity.

PES is not a straightforward process; the pricing of ecosystem services can be open to widely differing interpretations. Not only might the various parties concerned have very different ideas about what value to put on a given resource, but also it

can be challenging to define the limits of the service being traded. Furthermore, setting up markets for ecosystem services may create the need for supporting institutions, which in turn may put pressure on the communities and cultures.

Pricing in PES schemes can take various approaches. Price tags may reflect the total economic value (TEV) of ecosystems and their full range of services, including non-monetary values such as aesthetics or spiritual and cultural qualities. On the other hand, prices can just be based on the value of direct monetary benefits which are increased or secured for the beneficiary (such as clean drinking water), or decreased for the provider (such as the revenues from logging).

At present many PES schemes are publicly financed. Targeted market design and the development of appropriate institutional frameworks are needed to support the establishment and operation of markets for PES. Frameworks might include issues concerning land tenure, property rights, and decision-making mechanisms within local communities. Some form of access and/or usage rights are often a prerequisite for entering PES schemes, as only those who own ecosystems are able to sell them. Care needs to be taken to ensure that the design of institutional markets is suited to the local context. Otherwise there is a risk that a PES scheme may exert significant cultural and socio-economic pressures on local communities unaccustomed to working with and through markets for ecosystem services.

While the poor may face challenges entering PES schemes for lack of a title to their land or market competitiveness in providing PES, there is a clear link between poverty alleviation and ecosystem health. The poor rely disproportionately on ecosystem services for their livelihood and well-being and have few alternatives if they lose these services. Sustainable use of ecosystems and protection of biodiversity should be seen as key factors in poverty reduction. The wealth of the poor resides in the health of the ecosystems.

By generating income, PES can be a vehicle for empowering local communities, providing access to education and cultural participation. It can also provide an opportunity to escape from a life exclusively devoted to subsistence.

This publication seeks to unravel some of the complex issues raised by PES – and to illustrate the benefits PES schemes can bring both to the natural environment and to human well-being.

The 3 Capitals' fluxes

Source: GRID-Arendal 2012 Neumann, C. Solgaard, A. and Stoknes, PE

Definitions – Payment for Ecosystem Services

'It is a voluntary transaction in which a well-defined environmental service (ES) (or a land use likely to secure that service) is being purchased by at least one ES buyer from at least one ES provider if, and only if, the ES provider ensures the supply of the ES (i.e. there is conditionality)'.

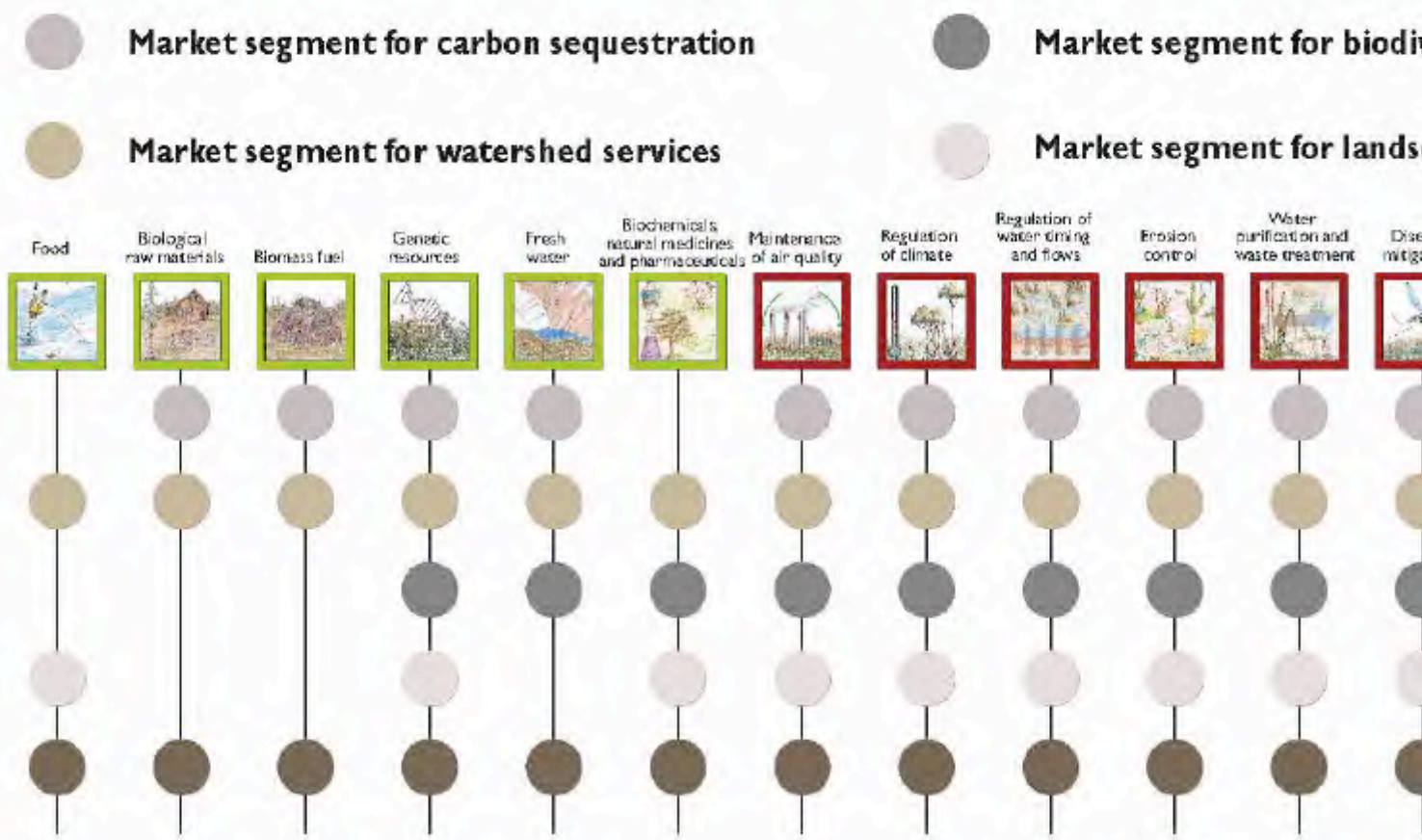
Source: Wunder, S. (2005) Payments for Environmental Services: Some nuts and bolts, Centre for International Forestry Research Occasional Paper No. 42. Centre for International Forestry Research, Bogor.

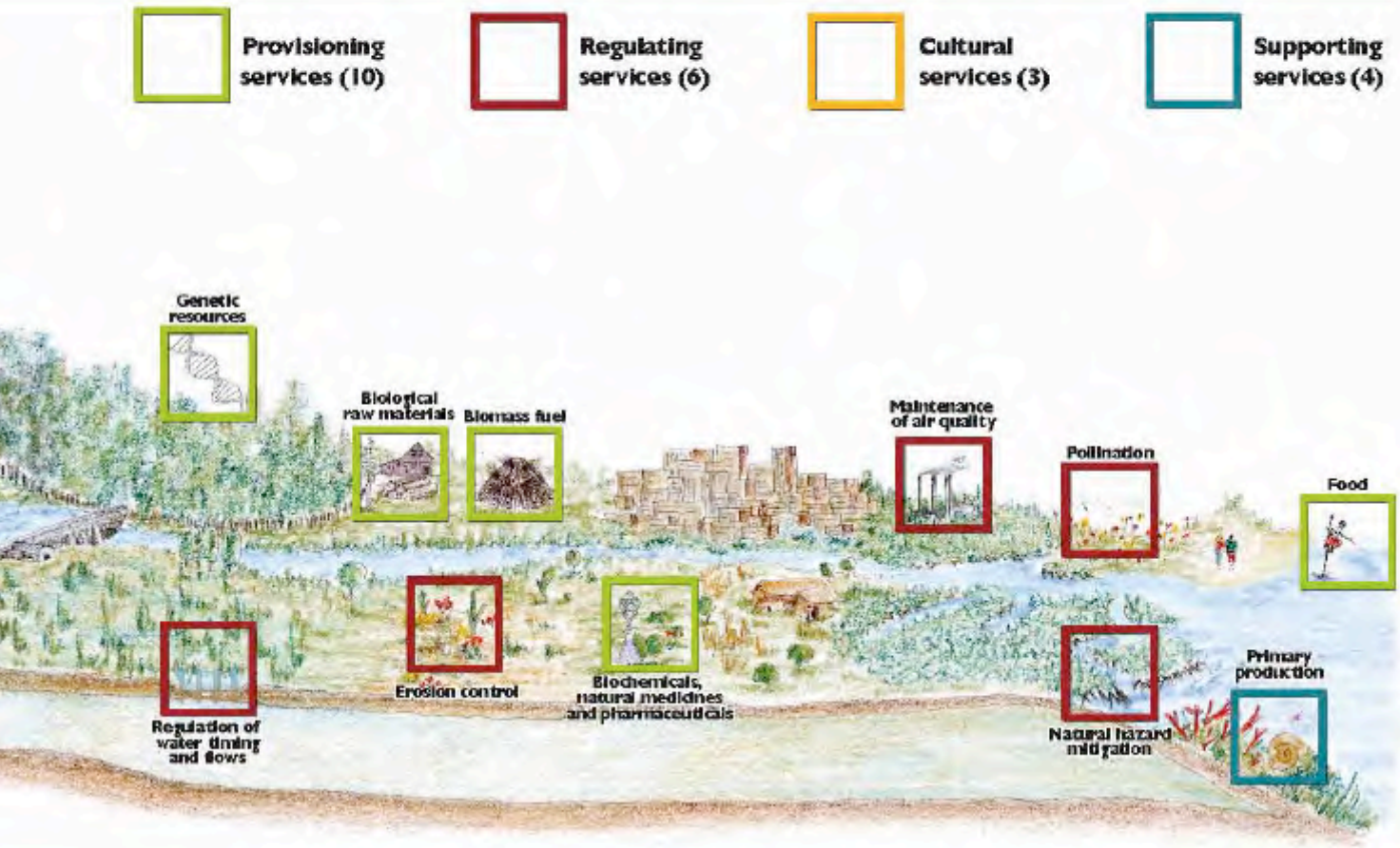
'A PES scheme is a transparent system for the additional provision of environmental services through conditional payments to voluntary providers'.

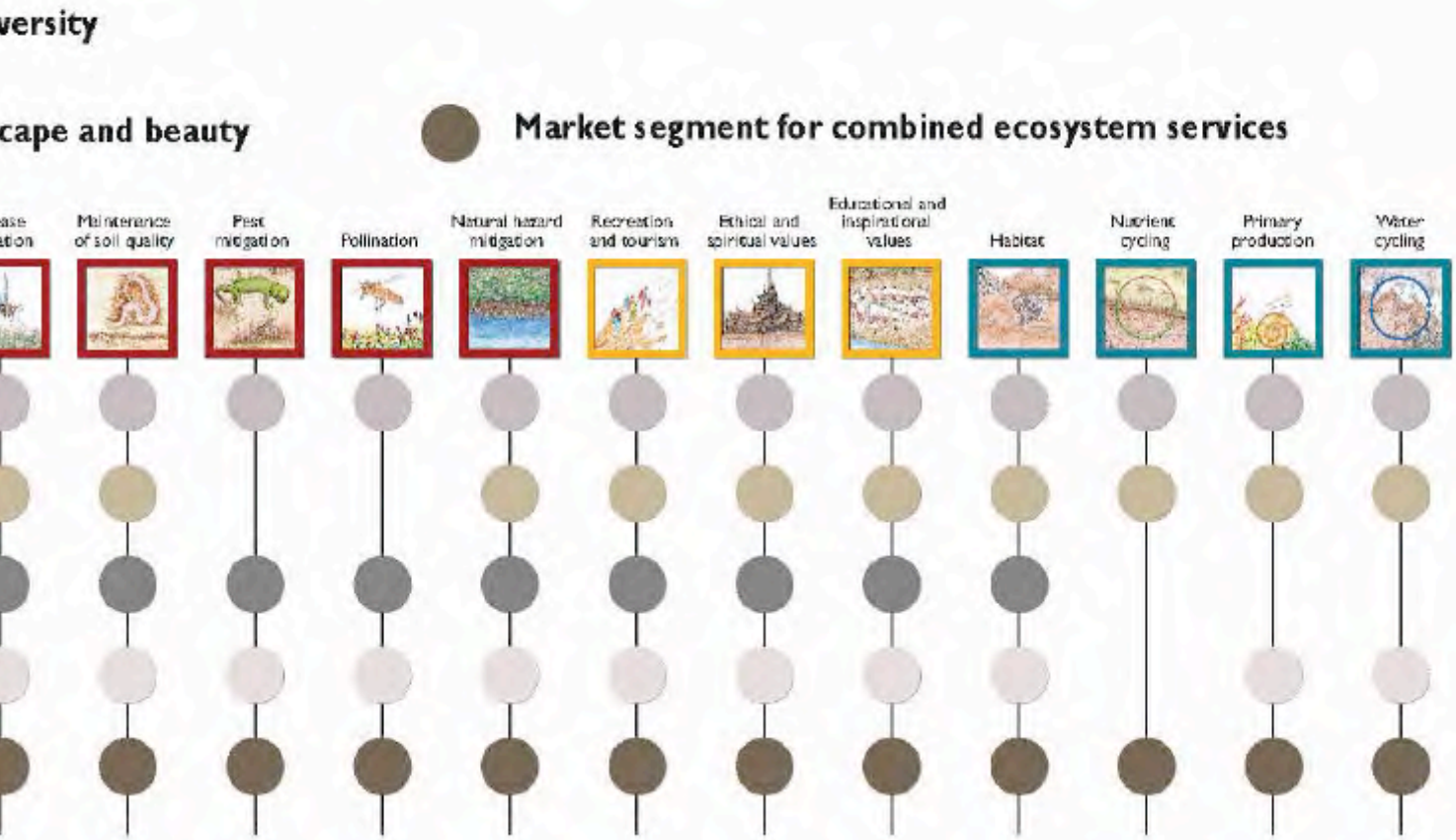
Source: Tacconi, L. (2011). *Redefining Payment for Environmental Services*. Ecological Economics, Jan 2012, Vol. 73, p29-36.

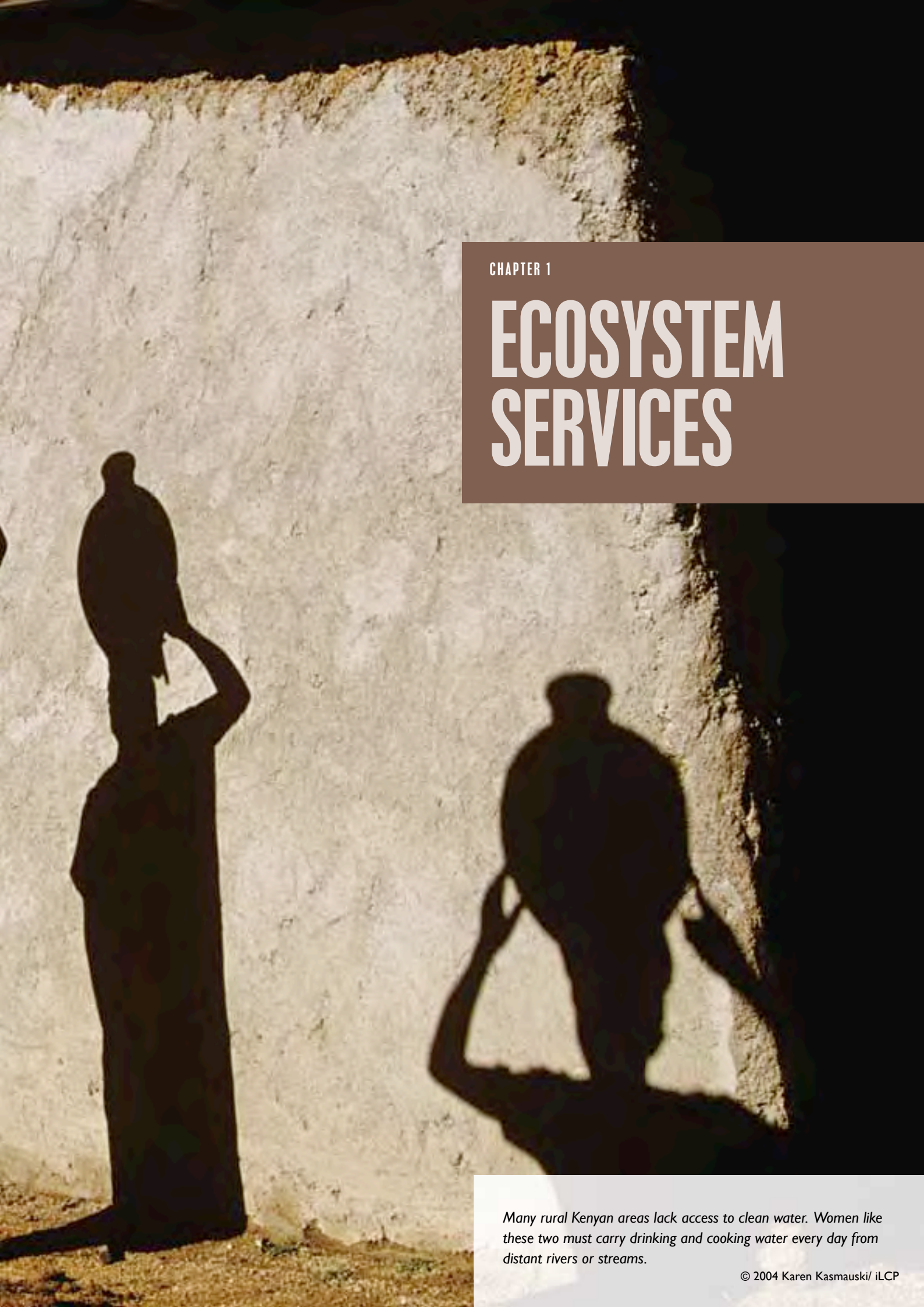
23 Ecosystem Services

Market Segments for Ecosystem Services




Provisioning services (10)
Regulating services (6)
Cultural services (3)
Supporting services (4)
Genetic resources
Biotical raw materials
Biomass fuel
Maintenance of air quality
Pollination
Food
Erosion control
Biochemicals, natural medicines and pharmaceuticals
Regulation of water timing and flows
Natural hazard mitigation
Primary production


versity
cape and beauty
Market segment for combined ecosystem services
Maintenance of soil quality
Pest mitigation
Pollination
Natural hazard mitigation
Recreation and tourism
Ethical and spiritual values
Educational and inspirational values
Habitat
Nutrient cycling
Primary production
Water cycling



CHAPTER 1

ECOSYSTEM SERVICES

Many rural Kenyan areas lack access to clean water. Women like these two must carry drinking and cooking water every day from distant rivers or streams.

Provisioning Services: *Goods or products derived from ecosystems*

Food

Tampakan, Kudat Bay, Sabah, Malaysia

Reef fish, like snapper, coral trout and grouper, fuel a multi-billion-dollar trade. A caretaker transfers live fish into pens.

Freshwater

Lake Nicaragua, Nicaragua

Water is used for drinking as well as cleaning. A young mother washes her child on the banks of Lake Nicaragua.

Biochemicals, natural medicines and pharmaceuticals

Quiandeua, Para, Brazil

A medicinal plant from the rainforest is used to heal an infected foot in a small village in the Brazilian Amazon.

Biomass fuel

Sandarban, Khulna Province, Bangladesh

Goran wood (*Ceriops sp.*) harvested from the mangrove forest is loaded onto boats by charcoal wood gatherers.

Biological raw materials

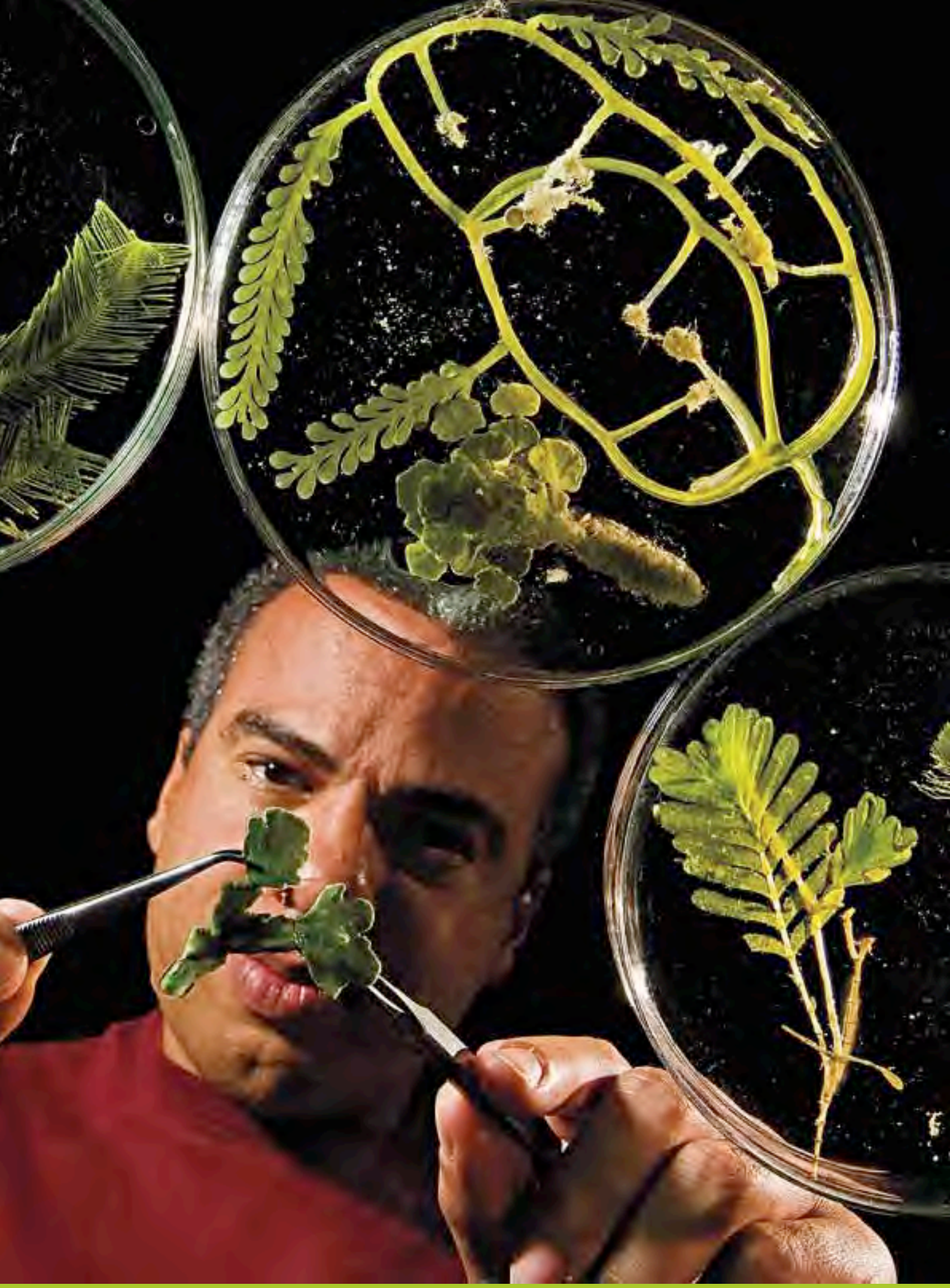
Brazilian Amazon, Para, Brazil

A local collects sap from a tree to produce rubber. Rubber tapping has long been a traditional way of sustainably harvesting resources from the rainforest.

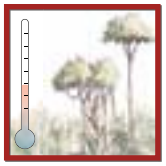
Genetic resources

Lizard Island, Queensland, Australia

Biologist Dr Fred Gurgel organizes algae specimens. Analyzing the molecular composition of plants, biologists use genetic data for biotechnology.

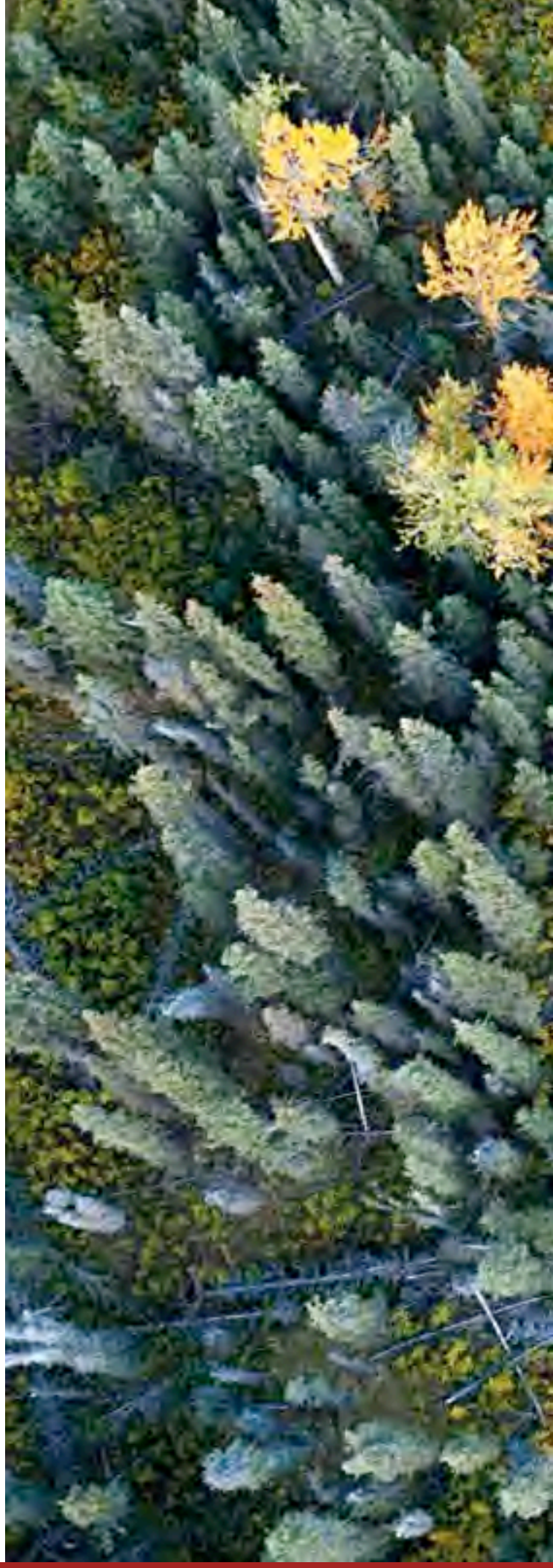


Regulating Services:
The benefits obtained from an ecosystem's control of natural processes



Regulation of climate

Boreal forest, British Columbia, Canada
Forests capture and store carbon dioxide. Aerial view of two streams flowing through the white spruce and poplar of the boreal forest.



Regulation of water timing and flows

Suffolk, Virginia, United States

Pristine wetlands frame the mouth of the Nansemond river, a tributary of the James river near Suffolk, Virginia, United States

Maintenance of air quality

Alpine Lake, West Kootenays, British Columbia, Canada

Lakes serve as sinks for air-borne pollutants, including industrial emissions of sulphur compounds.

Erosion control

El Pinacate Biosphere Reserve, Sonora, Mexico

The Pinacate Biosphere Reserve in Mexico's Sonoran desert boasts an impressive diversity of plants, birds, mammals and reptiles which adapt to survive in this arid ecosystem where freshwater is scarce.

Water purification and waste treatment

Yucatan, Mexico

Freshwater systems play an important part in decomposing organic waste.

Disease mitigation

Northern Brazil

A mosquito (*Toxorhynchites amboinensis)* caught in a vial may have picked up the yellow-fever virus from a monkey which carried it without ill effects. Intact forests reduce the occurrence of standing water – a breeding area for mosquitoes.

Maintenance of soil quality

Atewa, Ghana

Giant earthworms aerate the soil, improve soil chemistry and increase moisture retention.

Pest mitigation

Soberania National Park, Panama

A red-eyed tree frog eats a grasshopper.

Natural hazard mitigation

Yucatan, Mexico

Mangrove forests protect coastlines against storm surges.

Pollination

California, United States

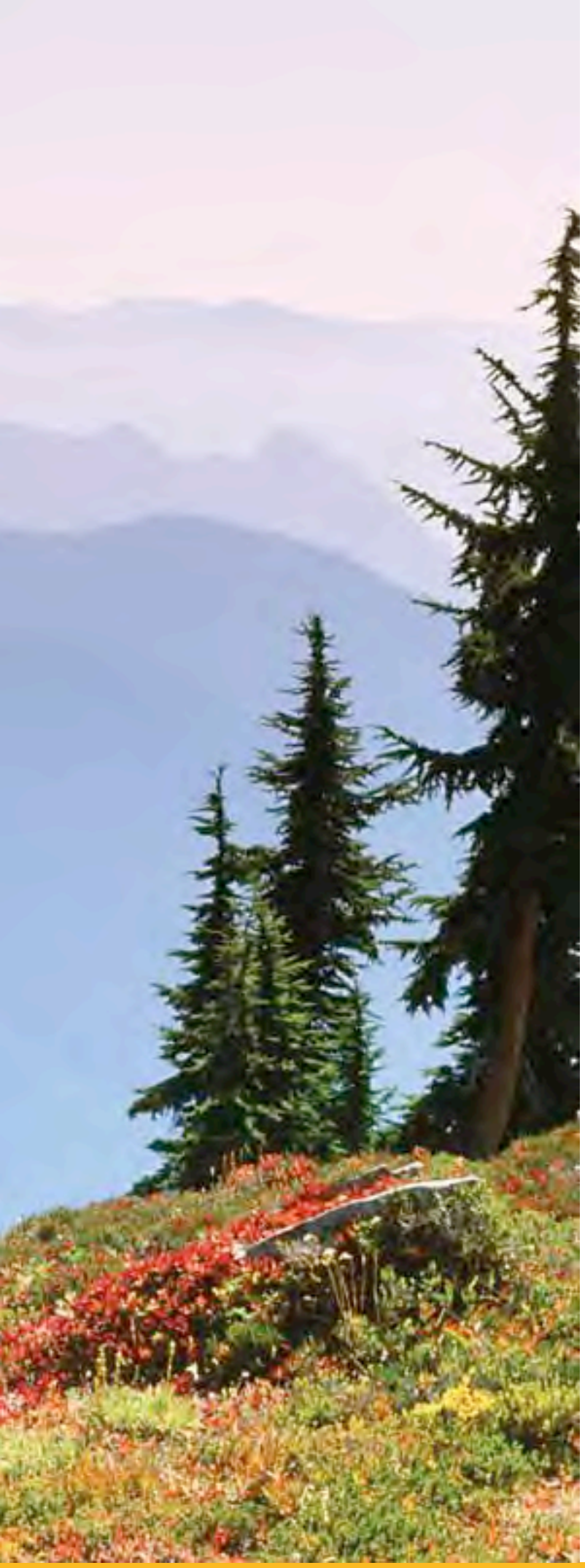
European honeybee (*Apis mellifera*) caught in the act of pollinating. An estimated one-third of all commercially-produced food is the result of insect pollination.

Cultural services:
The non-material benefits obtained from ecosystems

Ethical and spiritual values

Amazon Rainforest, Para, Brazil

A Kayapó man contemplates the rainforest.



Educational and inspirational values

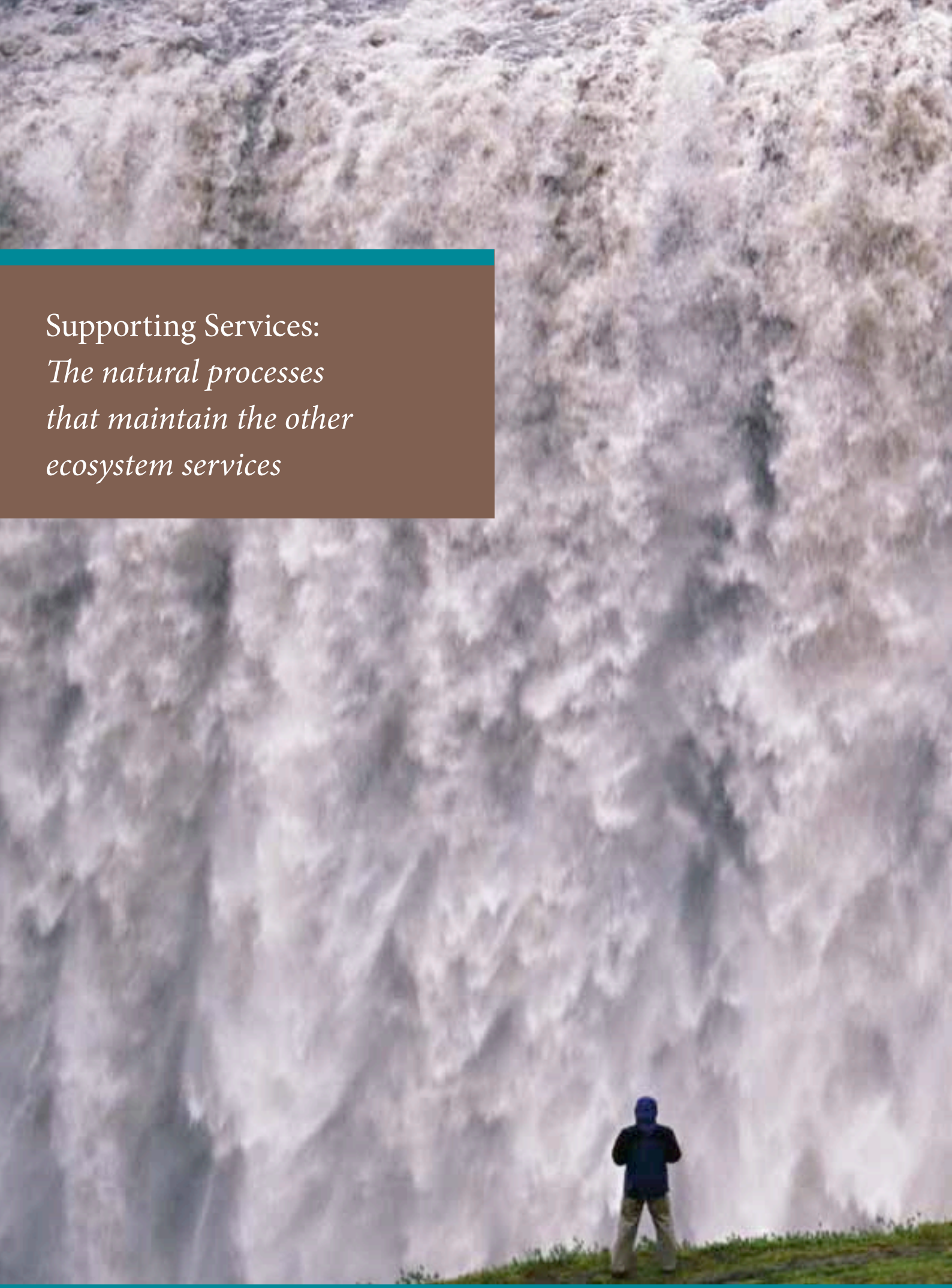
Bioko Island, Equatorial Guinea

Virginia Morell, author of a National Geographic story about the Bioko RAVE, at work on Bioko Island.

Recreation and Ecotourism

Mount Rainier National Park, Washington, United States.

A hiker enjoys the view at Mount Rainier National Park.



Supporting Services:
The natural processes that maintain the other ecosystem services

Water cycling

Dettifoss, Vatnajökull National Park, Iceland

Water from the Jökulsá á Fjöllum river, which flows from the Vatnajökull glacier and collects water from a large area in northeast Iceland, drops 45 metres into the Jökulsárgljúfur canyon.

Habitat

British Columbia, Canada

In early spring fertile green estuary sedges are the prime source of food source for bears.

Nutrient cycling

North Raja Ampat, West Papua, Indonesia

Fallen mangrove leaves add detritus to the soil.

Primary production

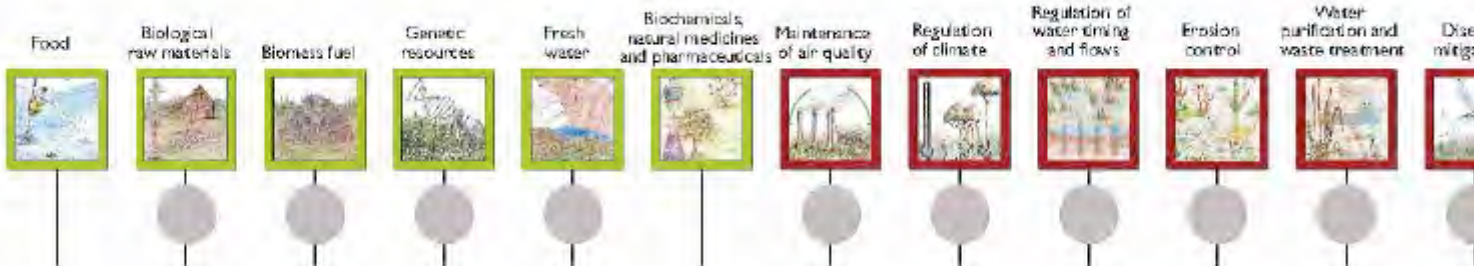
Contoy Island National Park, Mexico

Sea snail eating algae. Algae transform sunlight and nutrients into biomass, constituting the base of the food chain in aquatic ecosystems.

CHAPTER 2

PES MARKET SEGMENTS

Medicines used for Ayuraveda, all sourced from the jungle around India.



Market Segment for CARBON SEQUESTRATION: *Keeping the lid on emissions*

GREENHOUSE GASES (GHG) are released into the atmosphere by various human activities, including burning fossil fuels (oil, natural gas and coal) and clearing natural vegetation for development purposes (agriculture, infrastructure). Carbon sequestration refers to the uptake of carbon dioxide (CO_2), a primary GHG, into a natural or artificial reservoir for a long period of time (Trumper *et al.* 2009). The goal of carbon sequestration is to store carbon which would otherwise be released into the atmosphere, where it contributes to climate change.

Carbon is primarily stored by biological or physical processes – in biomass by photosynthesis and physically in soil and rock formations. Terrestrial carbon, stored in plant biomass and soil in forest land, plantations, cropland and pasture, is often called 'green carbon'. The world's oceans bind an estimated 55 per cent of all carbon in living organisms – phytoplankton and coastal plants (Nellemann *et al.* 2009). 'Blue carbon' refers to carbon sequestered by coastal habitats – particularly mangroves, marshes and sea grass – and carbon stored in biomass and buried in marine sediments.

The other main type of carbon sequestration is an industrial process whereby GHG from power plants and other large emitters is captured, compressed and stored in geological formations, either on land or below the surface of the sea. These processes, referred to as carbon capture and storage (CCS) or geological sequestration, are relatively recent innovations and have yet to be implemented on a large scale.

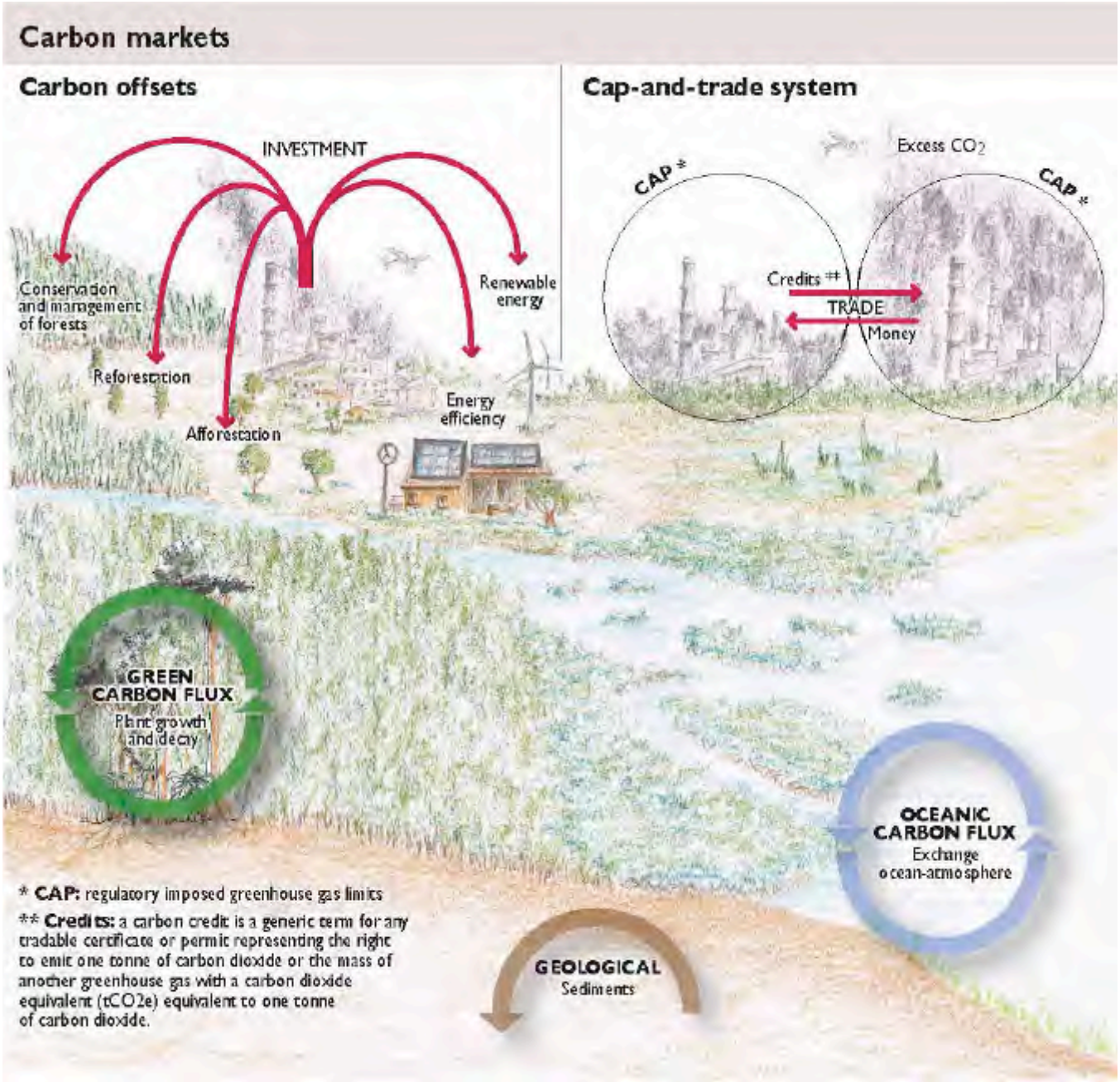
Carbon markets also provide economic incentives for reducing emissions through carbon emissions trading, sometimes called Cap and Trade. Carbon is traded through credits generated either by government-issued permits or project-based credits.

Under the Cap and Trade system emitters exceeding regulatory imposed 'caps' on GHG limits – typically energy companies, heavy industry and more recently aviation companies – purchase carbon permits from entities with CO_2 emissions below their cap. For the most part Cap and Trade is carried out through market exchanges, of which the most prominent is the European Climate Exchange.

Carbon credits can also be generated by investing in 'on the ground' projects, but the credits may not be traded. Under this system GHG emitters – private or public bodies, individuals – seek to 'offset' their emissions in various ways. They may invest directly in the recovery of ecosystems through, for example, a forest planting project which captures carbon, or invest in renewable energy or projects promoting greater energy efficiency. Over recent years there has been substantial growth in such project-based transactions.

Such transactions may be voluntary or required by legislation, the latter obliging the relevant bodies to reduce or cap their carbon emissions within a certain timeframe. Such legislation may be framed at a local, national or international level. At the international level, markets for carbon sequestration are taking shape under the Clean Development Mechanism (CDM) established by the Kyoto Protocol as part of the UN Framework Convention on Climate Change as well as voluntarily for pre-compliance purposes.

Elements of the CDM provide for planting trees as a means of compensating for, or offsetting, GHG emissions. Both afforestation (growing forest on land which has been without such cover for at least 50 years preceding 1990) and reforestation (planting forest on degraded woodland) are supported under the CDM scheme (USAID 2007). Recent technical innovations which are able to accurately measure the amount of CO_2 sequestered by a given stand of trees or unit of land have made it much easier to set a price tag for carbon. Until now, the storage of carbon in trees which would otherwise have been felled – known as 'avoided deforestation' – has not been eligible under CDM provisions. However, experimental markets outside Kyoto-type arrangements exist, rewarding measures designed to preserve forests which might otherwise be lost.



The UN collaborative programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) is another PES-type mechanism which focuses on terrestrial carbon sequestration.

Marine and coastal conservation communities are currently trying to extend carbon markets to coastal ecosystems which store blue carbon. Methodologies for generating carbon credits from these habitats are being developed, the most advanced of which are for mangrove forests, estimated to store up to 50 times as much carbon in trees and soil as some terrestrial forests (Nellemann *et al.* 2009).

Case study:

FARMERS AND FOREST DWELLERS IN MEXICO

The Scolel Te Plan Vivo project involves more than 670 producers and nearly 50 communities in the central and northern Chiapas and northeast Oaxaca areas of southern Mexico. It is a model for community-based, sustainable land use and sequestration projects in developing countries.

The project, established in 1996 and operating on an entirely commercial, self-sufficient basis since 2002, aims to deliver a wide range of CO_2 sequestration and emissions-reduction benefits from changes in land use activities. Local people involved in the scheme – the so-called producers – combine existing land uses and agricultural activities with sequestration projects such as the creation and restoration of indigenous forest and woodland as well as agroforestry activities. Most are small-scale farmers, forest dwellers and other land users with recognised land tenure or user rights. Altogether the Plan Vivo project brings together about 2 400 Mayan and Mestizo families.

Under the scheme, sequestration and emission reductions are 'bundled' together with social and other benefits: together the delivery of these services combines to make up credits – Plan Vivo certificates – paid to producers. Over the years the project has developed rigorous carbon accounting procedures with producers being paid for the supply of ecosystem services only at the end of a certification and monitoring process.

Project coordinators – usually local or national NGOs, or non-profit organizations – recruit producers and coordinate training. They negotiate purchase-contracts with buyers of credits in the carbon market and oversee carbon payments too. Plan Vivo is estimated to have been responsible for sequestering many thousands of tonnes of CO_2. By the end of 2010 the project had sold more than 432 166 Verified Emission Reduction offset credits (VERs) on the carbon market. It has also brought about major changes in land use and various social benefits.

Scolel Té: growing up with trees

Region

Land management systems

Forest management and conservation

Conservation and sustainable management of existing forests and implementation of activities that reduce pressure on these areas.

Improved fallow

This system involves the management of secondary vegetation for the production of timber, fuelwood and other products through enrichment planting.

Forest restoration

This system involves the restoration of open pine forest that has been degraded in the past through harvesting fire and grazing in order to increase the stocking of commercial species.

Taungya

This is a silvicultural system involving the establishment of forestry plantations through intercropping with annual crops for the first few years. This reduces the opportunity costs of plantation establishment. The annual crops provide some additional income and the saplings benefit from the maintenance of the crops.

Improved coffee plantation

This system involves enrichment planting of timber trees to provide shade in coffee plantations and aims to buffer small-scale farmers coffee price fluctuations through diversifying production.

Live fence

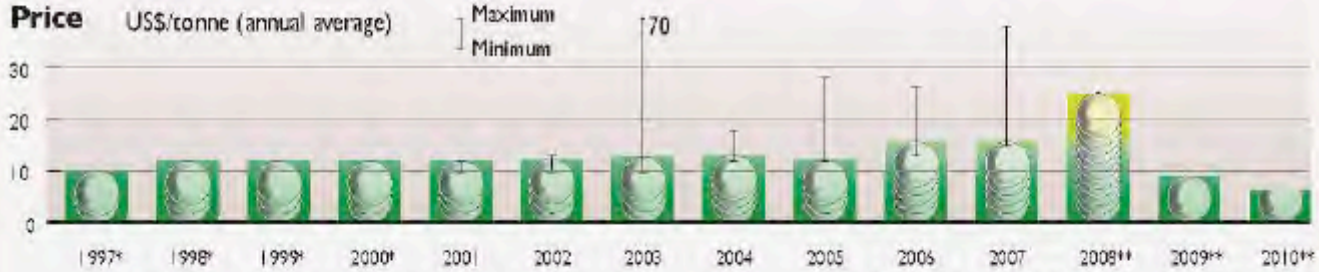
Live fences may be established by planting trees around the edge of arable fields or areas of pasture. The trees produce timber and other products.

Area Hectares

Producer families

Sold CO_2 Thousands of tonnes

Price US$/tonne (annual average)

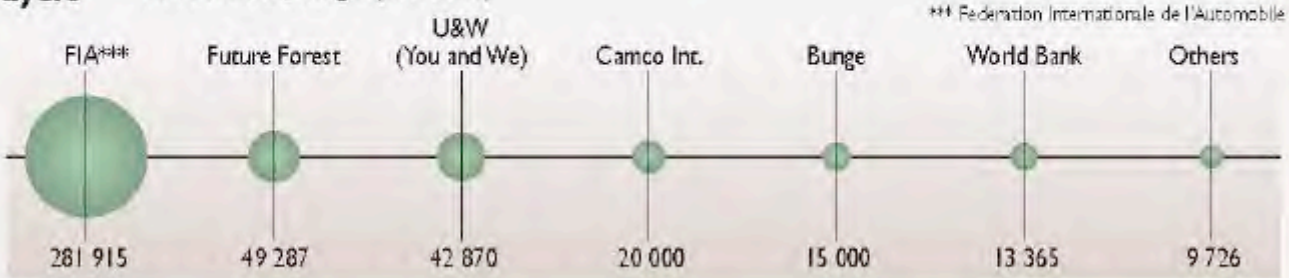


* From 1997 to 2000 all tonnes where sold at the same price

** For 2008, 2009 and 2010 only average price is available

Buyers Tonnes of CO_2 bought (1997-2010)

*** Federation Internationale de l'Automobile



Sources: AMBIO: Scolel Té Program Annual Reports, 2002-2010 (www.planetro.org); National Commission for the Development of Indigenous Peoples: "Regiones indígenas de México", 2006; National Secretary for the Environment and the Natural Resources (SEMARNAT): "Áreas Naturales Protegidas Federales de México"; National Institute of Statistics and Geography (www.inegi.org.mx)

Market Segment for WATERSHED SERVICES: *Keeping taps open and supplies clean*

A **WATERSHED** is an area of land which feeds water into a river or a lake: watersheds can be large or small. Every stream, tributary and river has an associated watershed which then feeds into a larger watershed. A variety of ecosystems can make up a watershed, including various bodies of water, wetlands, grasslands, forests and cultivated areas.

Watersheds provide a wide range of goods and services which support human welfare. They supply water for drinking and irrigation and regulate hydrological flows as well as sediments important for agricultural and aquaculture activities. Healthy watersheds provide food and habitats for wildlife (MA 2005a).

Watersheds also have aesthetic value and can promote and foster cultural identity (Smith *et al.* 2006).

Watersheds connect people upstream and downstream. The well-being of those living downstream is intimately tied to the activities of people in upstream areas. For example, if large numbers of trees are felled in an upstream area, water run-off will increase, entailing the risk of flooding downstream. Good watershed management benefits both upstream and downstream dwellers.

A key way of encouraging better watershed management is by evaluating and paying for various environmental services in relevant areas. Payment for watershed services (PWS) can act as a big incentive to improve watershed management and change land-use practices which might otherwise damage the overall health of the area concerned.

Gaining recognition for the value of these services and establishing their monetary value are the first steps in the process of PWS implementation. A market then needs to be designed and implemented in which buyers and sellers of the various services can operate: intermediaries – usually government agencies, NGOs or commercial brokers – often play an important role in bringing parties together. Property, access and use rights for both seller and buyer, provider and beneficiary, may also need to be established (Smith *et al.* 2006).

In many cases governments themselves or NGOs pay sellers for carrying out certain environmental activities (Stanton *et al.* 2010). These might be designed, for example, to reduce or alter patterns of fertilizer and manure use by farmers on lands. Payments could also involve reforestation activities or measures to enforce protected areas. Benefits of such actions include maintaining and improving ecosystems' flood reduction capability and provision of clean water to downstream areas.

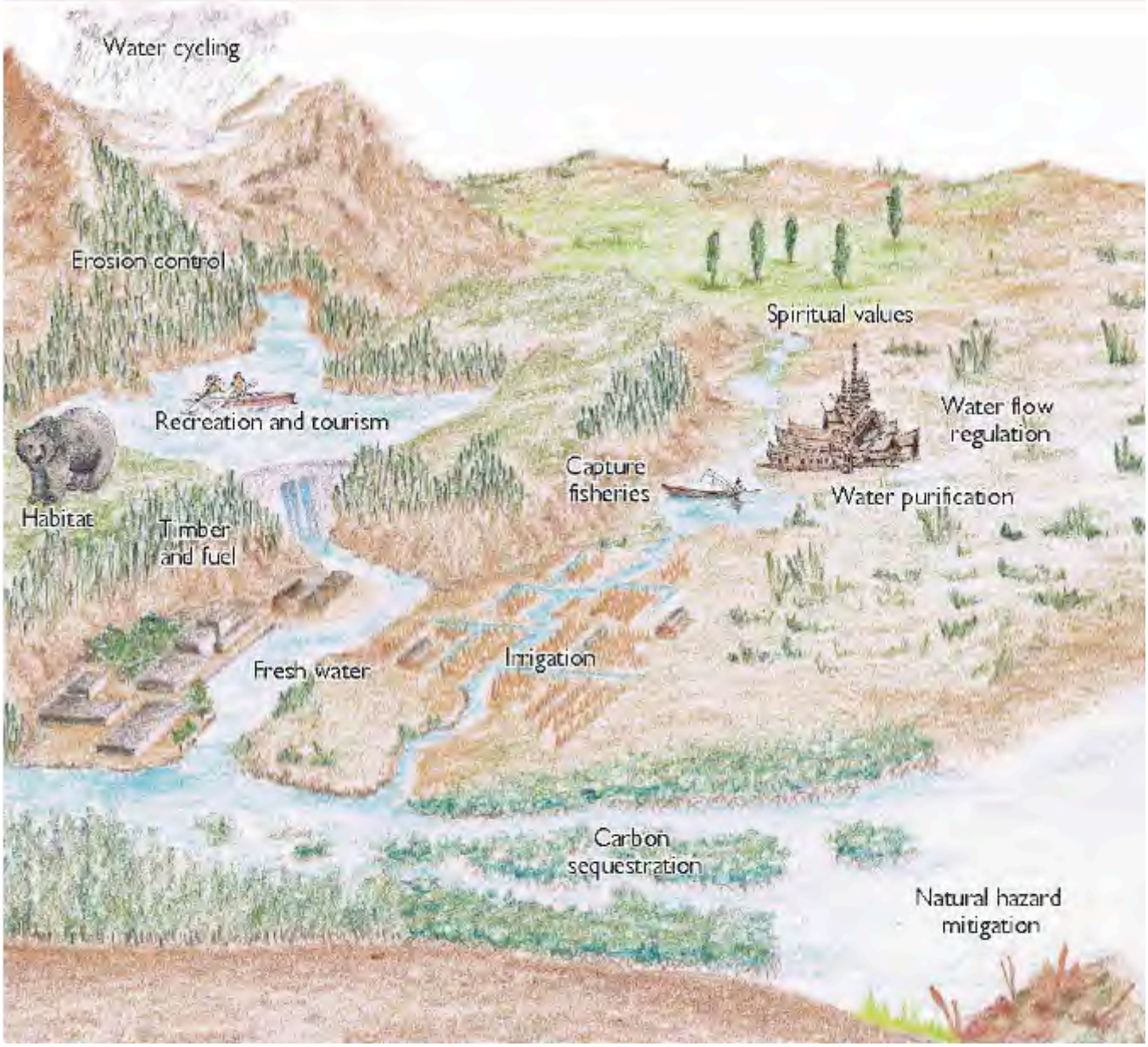
Pricing for watershed services has varied widely – from US$0.1 to US$7 500 per hectare per year (Stanton *et al.* 2010). Prices are mostly negotiated between stakeholders or set administratively, rather than through competitive markets (Bond and Mayers 2010).

An assessment examining watershed payment programmes around the world has identified a total of 216 schemes: of these 113 were active in 2008. PWS transactions up to 2008 amounted to a total value of US$50 billion, covering the protection of 32 million square kilometres of watershed areas worldwide (Stanton *et al.* 2010).

China contributed most to programmes both in terms of number and in terms of finance committed. Historically Latin America has been the most important region for PWS activities and still is the most innovative area. Though trends indicate continued growth in PWS, the market for the exchange of such services is still considered as under-performing (Stanton *et al.* 2010), with many projects considered too small to provide meaningful environmental protection on an appropriate scale.

Greater government involvement is required to stimulate demand for environmental services and promote PWS markets. Comprehensive regulatory frameworks need to be established (Stanton *et al.* 2010). Meanwhile private sector initiatives have contributed significantly to a greater understanding of watershed services and have generated associated payment schemes. Governments, NGOs and the private sector can now combine their respective strengths in order to address the growing challenges involved in the protection of watershed services.

Watershed services



Case study:

SUPPLYING NEW YORK CITY

New York City authorities are responsible for providing more than 9 million people in the city and surrounding counties with 5 billion litres of freshwater each day, most of it sourced from a 5 200 square-kilometre watershed area in New York State.

In the 1980s the city was faced with the need for new legislation on water management as water quality showed signs of deteriorating. Rather than investing in new filtration plants, officials decided to adopt a more progressive approach which would protect the water at source, by acquiring some upstate watershed land and protecting the surrounding forest.

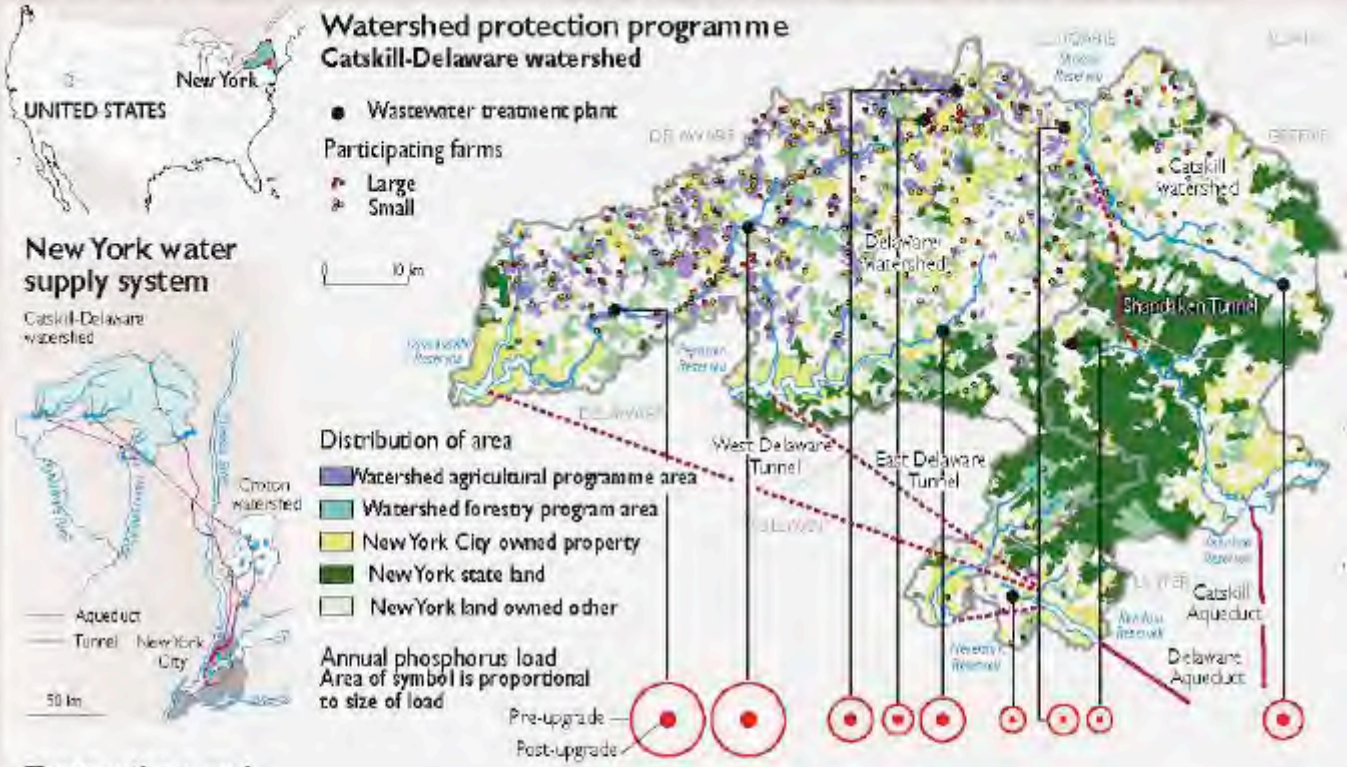
While development rights in some sensitive watershed areas were purchased over the years, the main part of New York City's programme – an early type of PES – has been a series of agreements with landowners who control more than 70 per cent of land in the catchment area. These agreements – often involving long and complex negotiations – include compensation to farmers and others for keeping lands in their natural state and for undertaking environmentally beneficial land and stream management measures.

Farmers also receive payments for implementing pollution prevention measures and for the cost of additional labour involved. Forest landowners who adopt good forest management practices such as low impact logging can benefit by receiving additional logging permits in other areas. Certain forest landowners are also entitled to an 80 per cent reduction in local property taxes.

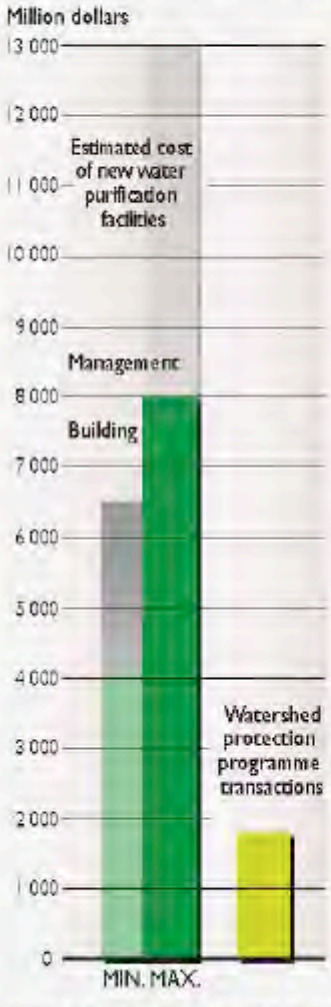
A 9 per cent increase in New York City water bills funded much of the US$1.5 billion decade-long expenditure programme in the watershed area. Building the filtration facility, however, would have cost between US$4 and US$8 billion, plus annual operating costs of another US$250 to US$500 million. The benefits of New York's watershed protection measures are not only financial; the programme is considered to be a successful experiment in taking shared responsibility for watershed protection and, according to officials, it continues to deliver safe and healthy water.

Source: Appleton 2002; Perrot-Maître and Davis 2001; Stanton et al 2010

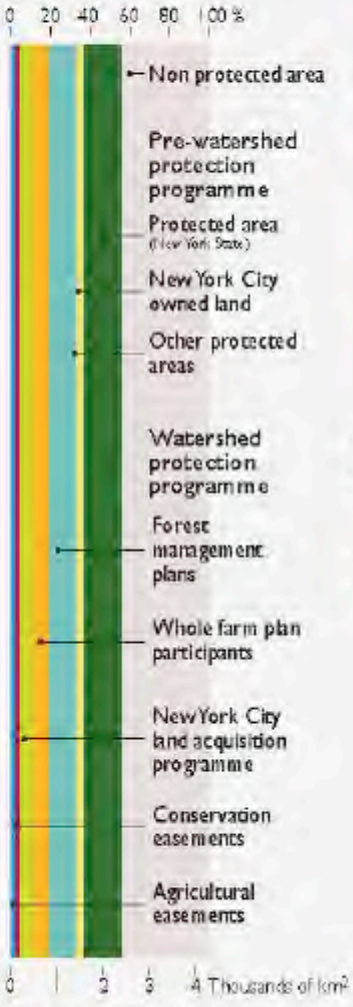
Catskill-Delaware watershed: champagne drinking water for New York City



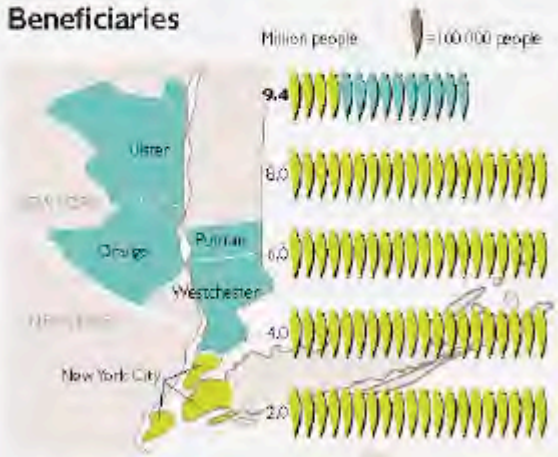
Transactions and avoided costs (1997-2008)



Distribution of area

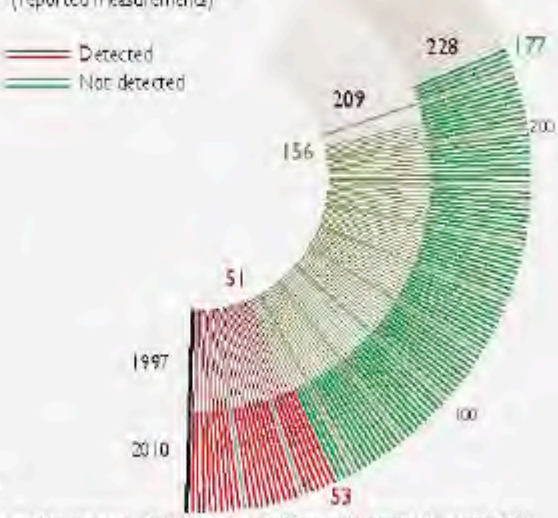


Beneficiaries



Water quality

Total measured parameters (reported measurements)



Sources: Bond I. and Rogers J. "Fair deals for watershed services"; IIED (International Institute for Environment and Development), 2010; Forest Trends: "State of Watershed Payments", 2010; New York City Department of Environmental Protection "Long-Term Watershed Protection Program", 2006 and 2011; "New York City Drinking Water Supply and Quality Report" 1998 and 2010.

Market Segment for BIODIVERSITY: *Everything is connected*

BIODIVERSITY IS THE BASIS for healthy ecosystem services which in turn are essential for optimal human well-being. Biodiversity refers to 'the variability among living organisms from all sources ... and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems' (United Nations, 1993: *The Convention on Biological Diversity, Article 2).*

Markets for biodiversity services are often intertwined with other market segments, functioning alongside or packaged with multiple ecosystem services. For example, markets for biodiversity services can be combined with those for carbon sequestration to support bio-carbon offsets and sustainable forestry. A PES designed to protect a watershed and maintain freshwater systems may, by extension, also have the effect of conserving biodiversity in the area. Biodiversity services may also be combined with a PES relating to landscape beauty services such as those involved with eco-agriculture and eco-tourism. Biodiversity services may also contribute to promoting more sustainable fishing practices. And in some cases biodiversity can be enhanced by strengthening ethical and spiritual values. Other markets for biodiversity services might include bio-prospecting for genetic resources, biodiversity offsets and biodiversity management services.

The International Union for the Conservation of Nature (IUCN) highlights that PES schemes focusing on biodiversity need to establish clear priorities, with realistic targets and achievable timetables. This is of course true for any PES service, but particularly pertinent for the biodiversity market segment as it is so highly interlinked with the other markets. If such a scheme is intertwined with other programmes, it is important for a common standard covering all services to be adopted. It is equally important for information on such schemes to be clear and easily available and, as with all emerging PES markets, a comprehensive monitoring and compliance regime is needed.

For a PES scheme to be successful a system of structures and institutions is essential to enforce land rights which in turn enable the involvement of a strong and motivated local community. If a community is not supported by appropriate institutional frameworks helping to protect their land from natural resource exploitation, then a PES scheme will be difficult to implement. At the same time those who might stand to benefit from activities which may threaten biodiversity, such as mining, logging or oil exploration enterprises, need incentives to conserve biodiversity.

Emerging PES markets include land markets for habitats of high biodiversity value, payments for biodiversity management, payments for private access to view a species or see its habitat, tradable rights and credits and biodiversity-conserving businesses (Bishop *et al.* 2008).

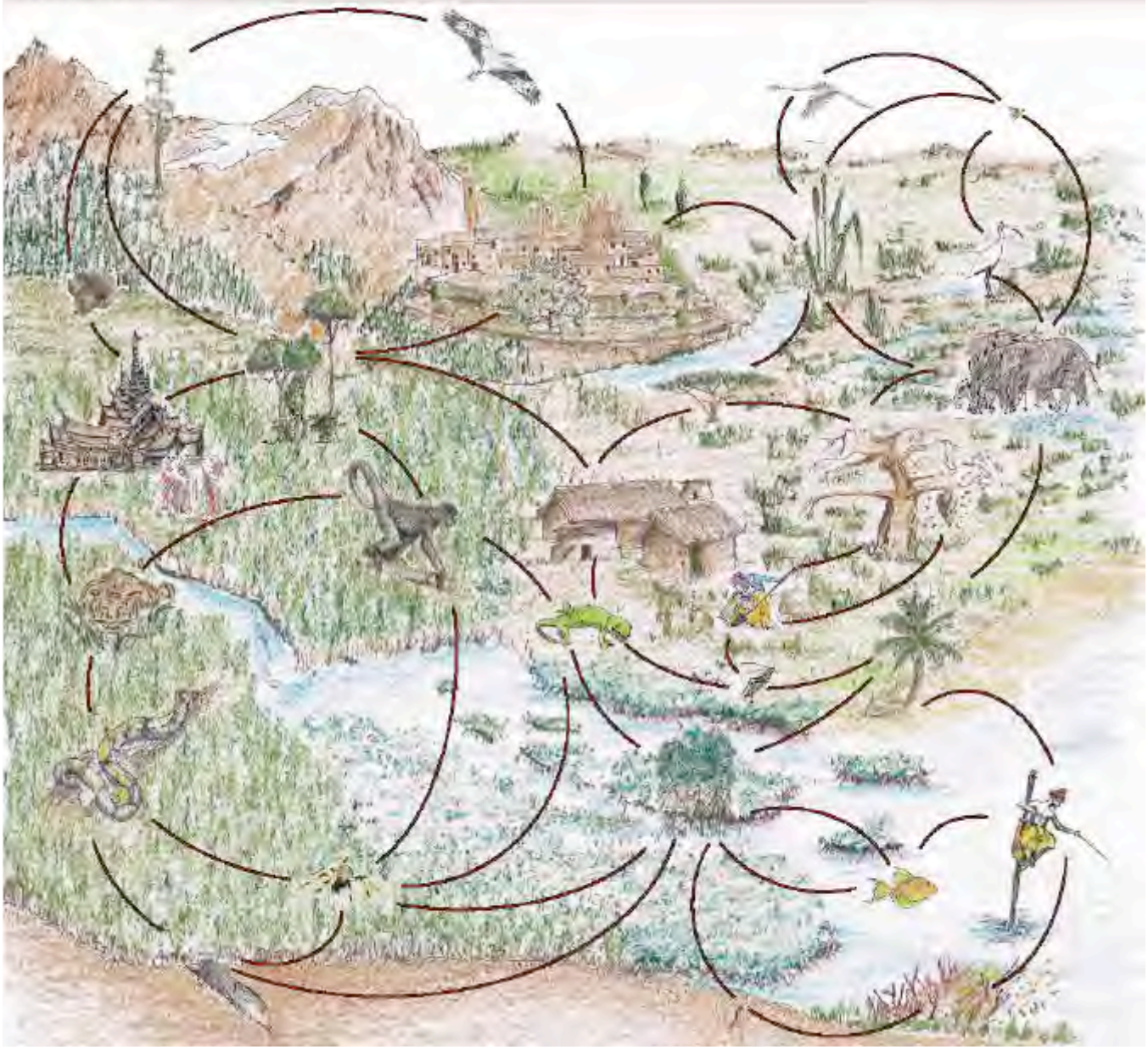
A market for biodiversity services can be driven by various factors. In some cases markets can be structured to support biodiversity conservation on a community level, while in others biodiversity conservation might be linked to a specific goal, such as combating climate change.

Traditionally, governments – not commercial markets – have been the main players in trying to conserve biodiversity and ensuring important ecosystem services continue to function, such as through protected areas. Now, with a new emphasis on market involvement, the question is just how big a role the private sector can play through PES schemes.

Considerable progress has been made in framing PES schemes related to biodiversity conservation, but clearly PES is not the only answer to questions of species and habitat preservation. Yet it can play an important role.


Maintenance of soil quality
Pest mitigation
Pollination
Natural hazard mitigation
Recreation and tourism
Ethical and spiritual values
Educational and inspirational values
Habitat
Nutrient cycling
Primary production
Water cycling

Web of life



Case study:

YASUNI NATIONAL PARK, ECUADOR

The Yasuni National Park in Ecuador is generally considered to be one of the richest biodiversity 'hot spots' in the world. It is also rich in natural resources, including oil.

In 2007 Ecuador proposed a plan under which it would stop oil exploitation in the region if sufficient funds could be raised to compensate for lost oil revenues; the deal called for a compensation payment of 50 per cent of an estimated US$7.6 billion in lost oil revenues.

According to the UN, by November 2011 US$116 million had been raised – enough to temporarily stop oil exploitation in what is described as a 'core' area of Amazonian rainforest. Funds were raised from a wide variety of sources – termed 'crowdfunding'. Regional governments in France and Belgium contributed while countries which pledged support included Chile, Colombia, Peru, Australia, Spain, Georgia and Turkey. A New York investment banker donated her annual salary and several celebrities also contributed.

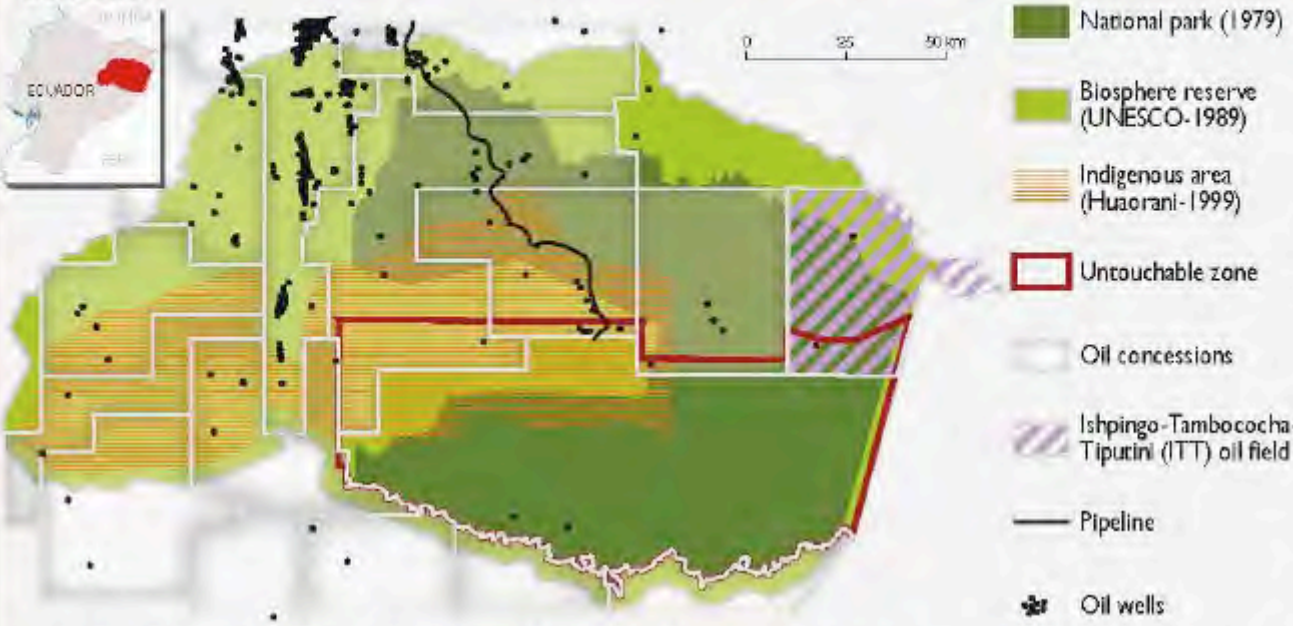
Supporters of the scheme – a form of national scale PES – say it could be a model for the way the world pays to protect important places. The money raised is guaranteed to be used only for nature protection and renewable energy projects. The challenge now is to broaden the scheme, ensuring the conservation of a wide range of vital ecosystem services while at the same time guaranteeing ongoing development revenue for the country.

The biological diversity of the Yasuní area has astonished scientists. One six-square-kilometre patch of the park was found to have 47 amphibian and reptile species, 550 bird, 200 mammal and more species of bats and insects than anywhere in the western hemisphere. The Yasuni region is also home to as yet uncontacted indigenous tribes.

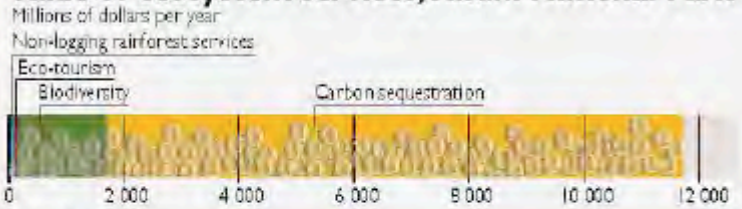
Sources: http://www.guardian.co.uk/environment/gallery/2011/dec/30/yasuni-national-park-ecuador-rainforest
http://www.eartheconomics.org/Page126.as

Keeping oil in the soil at Yasuní Park, Ecuador

Context

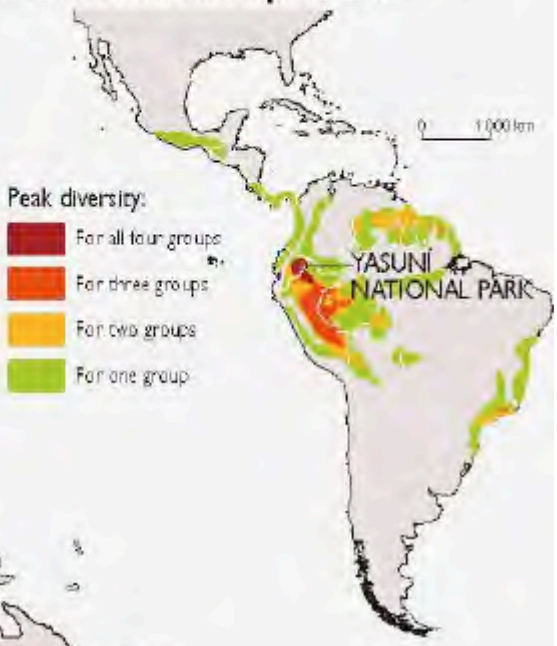


Value of ecosystem services, Yasuní National Park

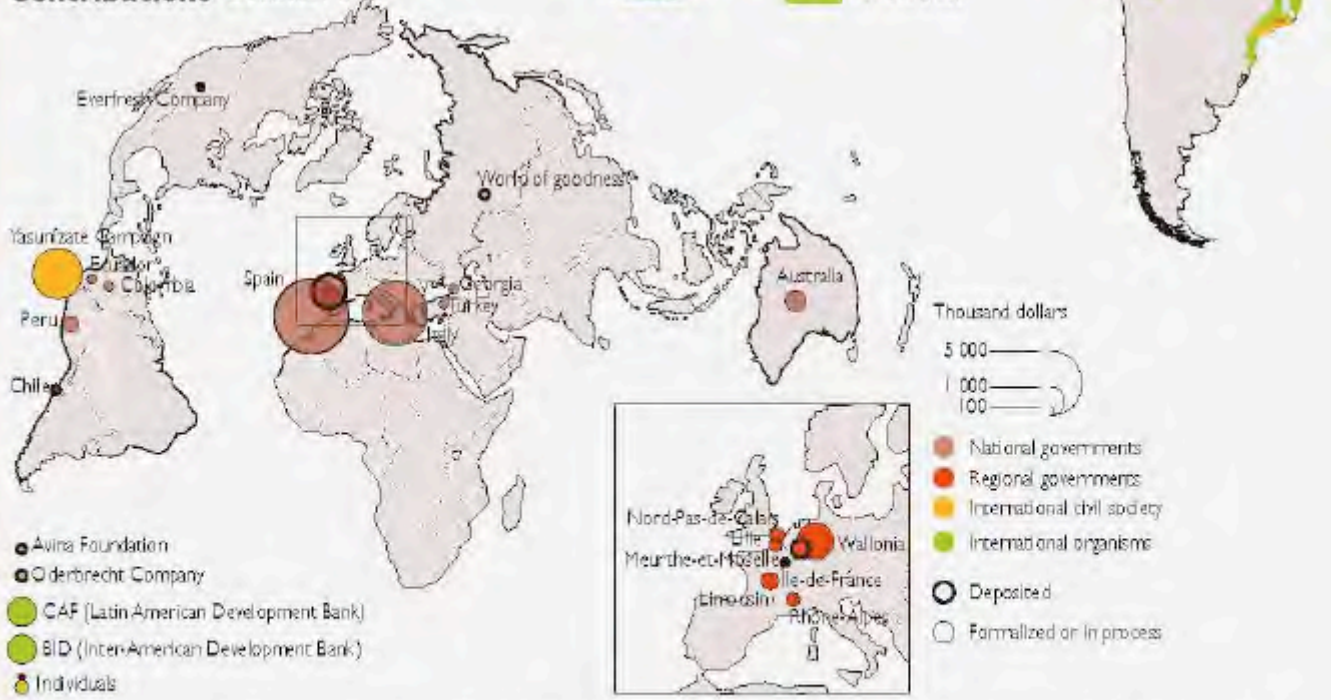


Biodiversity

Diversity centres for plants, birds, mammals and amphibians



Contributions December 2011



Sources: Ecologistas en acción, "La iniciativa ITT-Yasuní", 2011; Martínez, E. et al.: "El Sumak Kawsay es sin petróleo", 2010 (www.amazoniaporlavida.org); Jenkins, C. et al.: "Diversity Centers for Plants, Birds, Mammals and Amphibians", PLoS ONE, 2010; Larrea, C. et al.: "Conservation or oil extraction in Yasuní National Park? A transcendental challenge", Universidad Andina Simón Bolívar; Fondo Fiduciario Yasuní-ITT: "Situación de la Iniciativa Yasuní-ITT, Diciembre 2011", Yasuní-ITT, 2011.

Market Segment for LANDSCAPE BEAUTY: *Preserving nature's bounty*

LANDSCAPE BEAUTY SERVICES are dependent on the preservation of nature and the beauty of intact and uninterrupted landscapes. These services may involve the protection of natural heritage sites, coral reefs, cultural sanctuaries or traditional livelihoods (Mayrand and Paquin 2004).

Payments for landscape beauty are better established than payment schemes for most other environmental services, yet are hard to define and characterise and the market remains immature (Landell-Mills and Porras 2002; Biénabe and Hearne 2006). People have long been used to paying for non-consumerist recreation activities such as bird watching and boating and consumerist activities such as fishing and hunting. More recently, ecotourism – responsible travel to natural areas which aims to conserve the environment and local culture – has played a key role in this fast expanding market.

Tourism, often described as the world's largest industry, is growing at more than 4 per cent per year: within these figures, ecotourism is believed to be growing at three times that rate (UNWTO 2011; Milder *et al.* 2010).

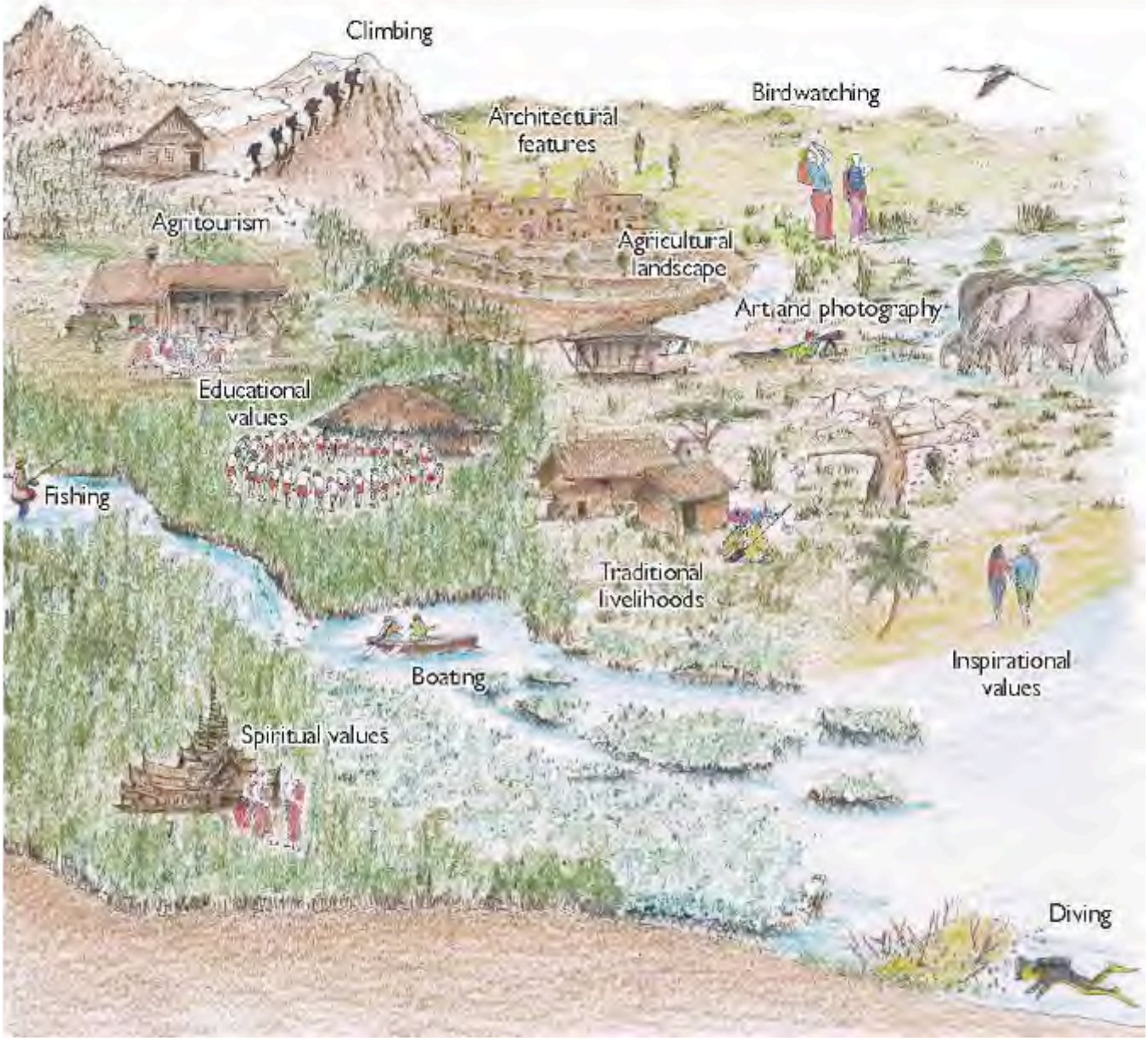
There is international demand for these services and tourism related PES can be a sustainable financing mechanism for conservation. The key is to ensure that the stewards, whether management agencies and/or local communities receive proper compensation – whether in cash or other non-monetary rewards – for their efforts to preserve the landscape and scenic beauty.

There are four main groups within this market – providers, beneficiaries, intermediaries and facilitators (Groot 2011). In the past a large part of the provision of such services has been carried out by governments through the creation of protected areas and heritage sites. More recently local communities have also been substantial providers of these services, which can include cultural practices, traditional land uses or architectural features (Mayrand and Paquin 2004). Farming communities can also provide landscape beauty services through the preservation of agricultural landscapes and practices.

PES schemes are not bound to protected areas and are often seen as a way of encouraging nature conservation outside strictly controlled zones. Payments for preserving biodiversity and landscape beauty often come from conservation NGOs or local businesses involved in ecotourism. Most payments are based on site-specific negotiations or reformed entrance fees, while many countries impose indirect taxes on tourists and tourism facilities. Governments might also raise revenue through the sale of licences and concessions to private tourism operators. However, it is important to note that in theory if the revenues are not used directly for management and conservation, it is not a true PES mechanism but a tax. In some, though not all, cases a proportion of revenues gained are used for conservation. It is also important to ensure that the bulk of fees raised through ecotourism projects remains within local communities (Landell-Mills and Porras 2002).

Globally, investment in the protection of natural habitats is shrinking. Government budget constraints mean that less funds are going to the upkeep of protected areas (Landell-Mills and Ford 1999; Brown 2001). As the overall tourism sector continues to grow, it is important that sustainable tourism and ecotourism practices, which contribute to raising incomes and preserving biodiversity are further replicated. These sectoral investments, when managed correctly, can assist in the otherwise declining global protection of intact landscapes, and in some cases the regeneration of cultural and natural areas.

Beautiful, inspiring nature



Case study:

CONSERVING TANZANIA'S WILDLIFE

Terrat village is a community of some 3 500 people involved mainly in pastoral activities in northern Tanzania. In 2004 a group of five tourism operators entered into a PES type agreement with the community, with villagers helping conserve wildlife in exchange for annual financial payments. The agreement covered 9 300 hectares of communally managed land traditionally used for dry season grazing: villagers agreed to desist from cultivating the area and to prevent the erection of permanent settlements. They also contracted to prevent activities such as charcoal burning and hunting.

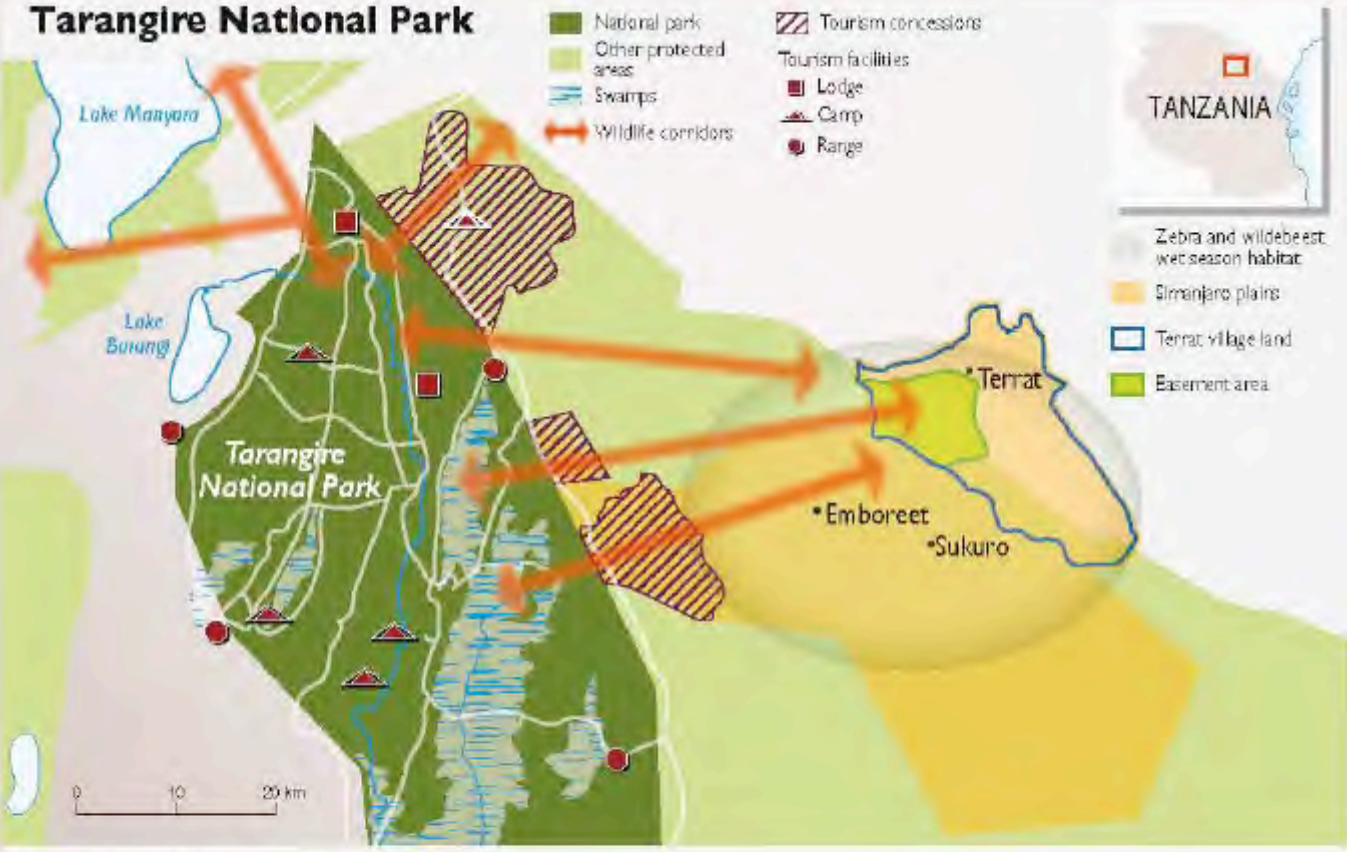
In exchange the tour operators would pay villagers approximately $4 500 annually. Separately the Wildlife Conservation Society agreed to fund US$300 a month to employ and equip four village scouts to carry out wildlife monitoring and other activities.

This relatively informal PES scheme seems to have been successfully implemented. Studies indicate that the project's viability has been achieved not only through monetary means. One key element was that the agreement explicitly allowed for the continuance of seasonal livestock grazing on the land – a vital activity generating community income.

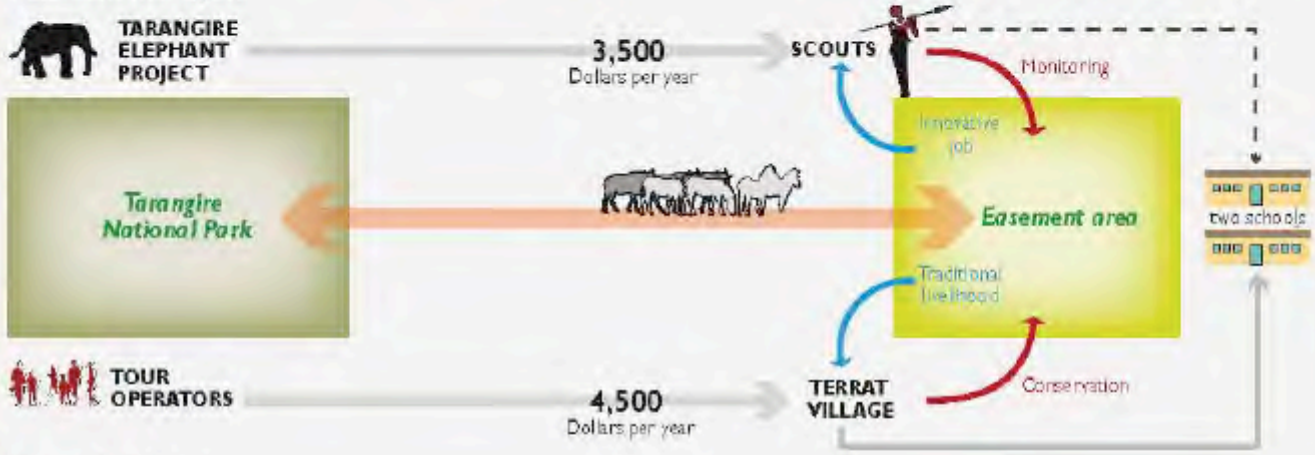
Another important element in the agreement was trust: villagers were familiar with the tour operators and their activities – and also understood the value of conserving wildlife both for financial and aesthetic reasons. Formation of a village management board to oversee the PES arrangement also helped: revenue from the PES has been invested in collective social services, including the construction of new schools. Other villages in the region have expressed interest in forming similar schemes. Preliminary evidence suggests such PES arrangements could well be more effective than investment in other conservation measures in terms of protecting land from agricultural encroachment and conserving wildlife.

Simanjiro Conservation Easement, Tanzania

Tarangire National Park

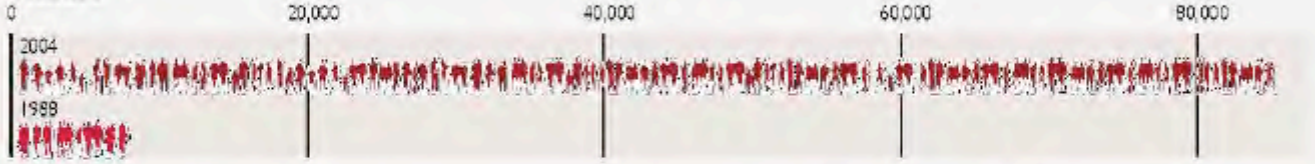


PES scheme cycle



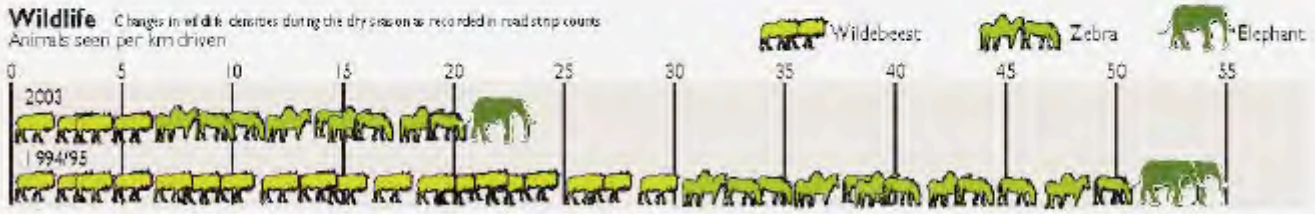
Tarangire Park

Visitors



Wildlife Changes in wildlife densities during the dry season as recorded in road strip counts

Animals seen per km driven



Sources: Ujamaa Community Resources Team: "Participatory land use planning as a tool for community empowerment in Northern Tanzania", IIED, 2010; Tanzanian Wildlife Research Institute: "Wildlife Counts", 2009; Nelson F et al. "Payments for Ecosystem Services as a framework for community-based conservation in Northern Tanzania", Conservation Biology, 2009; Nelson F: "Developing alternative frameworks for community-based conservation", USAID, 2008; Sachedina H: "Conservation, land rights and livelihoods in the Tarangire ecosystem of Tanzania", 2008.

MARKET SEGMENT FOR COMBINED ECOSYSTEM SERVICES: *Bringing it all together*

THE VALUE GIVEN to and associated with natural habitats by different stakeholder groups can vary widely. For example, sea grass meadows may offer recreational opportunities to the tourism industry (snorkelling and diving) but at the same time may represent a key source of income for both recreational and commercial fisheries (an essential habitat for lobster and snapper fisheries). Meanwhile, environmentalists may value the same sea grass meadows primarily as a critical resource for the conservation of endangered species (manatees and sea turtles). Ultimately, these values are related and connected through the need for a healthy environment. A combined PES scheme may be able to join several services and provide sufficient, robust and sustainable economic and conservation opportunities.

For the most part PES schemes have tended to focus on a single ecosystem service, whether it is connected with the conservation of a watershed, the restoration of a forest or the preservation of a wildlife area. Such an approach can be confusing – at odds with the basic idea that all things in the natural world are interconnected. It is now becoming evident that in some cases integrating various ecosystem services could lead to more viable PES schemes.

While methodologies aimed at bringing together various ecosystem services in PES are still being worked on, two categories are being devised; 'bundled' and 'stacked'.

A bundled PES scheme offers one payment for multiple services. Bundling would allow a landowner to combine multiple values from a piece of property under a single type of credit. For example, though the restoration of an acre of riparian forest results in improvements to more than one ecosystem service, these would be bundled into one type of credit, which could be sold on the voluntary or regulatory market (Defenders of Wildlife 2012).

A stacked PES scheme offers multiple payments for different services, allowing landowners to sell different types of credits from a single location or receive multiple revenues from carrying out the same action. For example, if a landowner restores an acre of riparian forest, water quality credits, carbon credits, riparian habitat credits and conservation banking credits could be accumulated, all of which the landowner could sell in their respective markets (Defenders of Wildlife 2012).

A PES scheme incorporating multiple ecosystem services may be necessary to allow landowners to access multiple sources of revenue. A single ecosystem service may not, by itself, generate enough funds to support sustainable conservation.

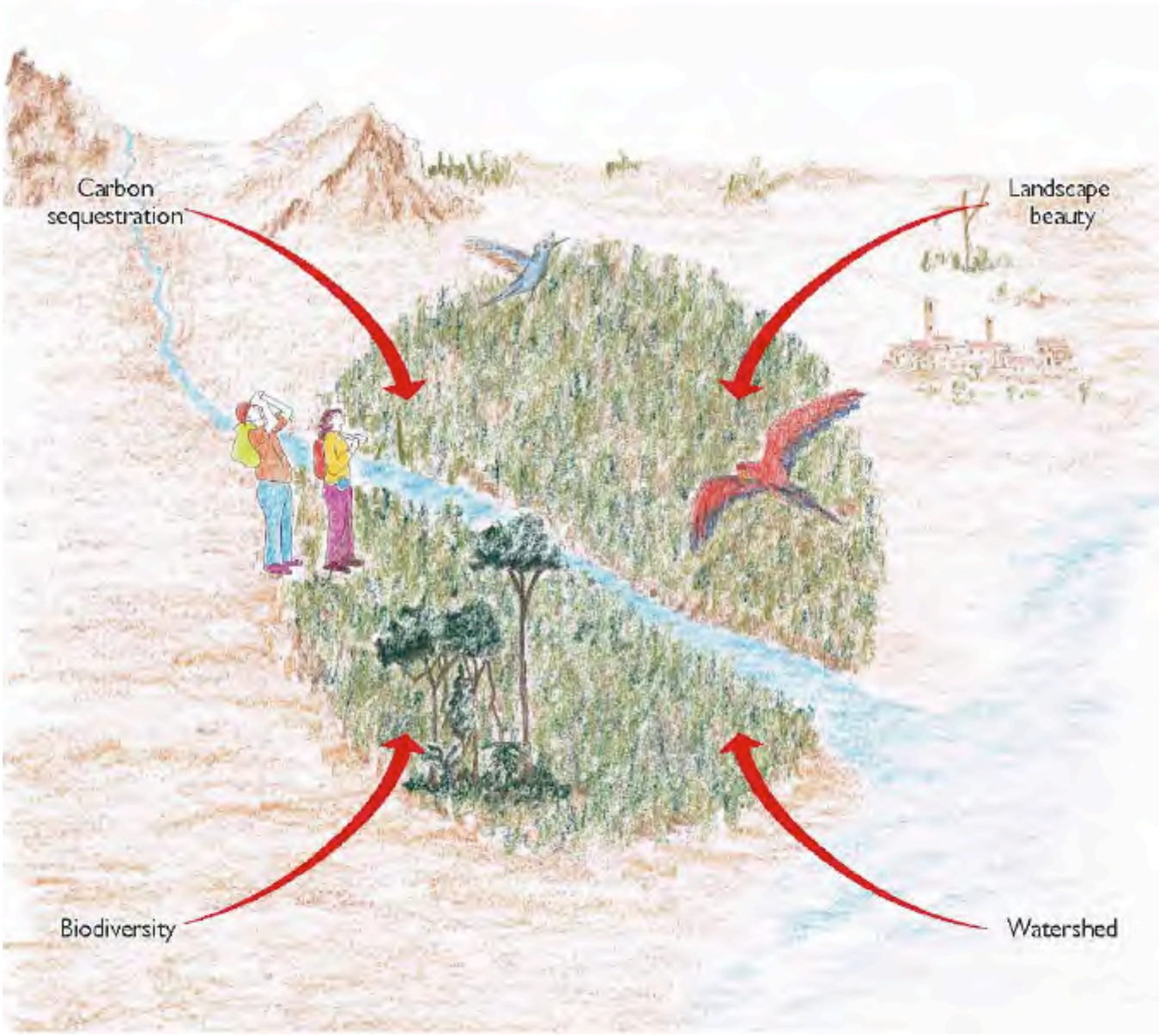
Combined PES projects are supported by a variety of revenue sources which may also provide greater protection against market volatility and offer greater financial security than projects depending on a single revenue stream (fluctuations in the carbon credit process).

A combined PES scheme could result in linkages being made between multiple beneficiaries and providers and have the potential of increasing funding opportunities – and achieving broader based improvements in the natural environment. In turn this would deliver benefits to people at both local and national levels and – in relation to climate regulation and biodiversity – at the international level, too. Greater cooperation between various local groups and a sharing of ecological values would make implementing PES projects easier. Conversely, failing to recognise the interconnectedness of ecosystem services can lead to the degradation of one service in order to improve another, which may have the knock-on effect of creating local conflicts and threatening community support for PES (Willamette Partnership 2011).

Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved water quality and biodiversity protection. 'Forest carbon', or the sequestration of carbon in forest biomass as an ecosystem service, has much potential to drive combined PES schemes due to its current association with climate change mitigation.

However, the payment for forest carbon offsets involves a key issue pertinent to discussion of combining ecosystem services

Bundled services



– 'additionality', a central component in most climate change markets. This term refers to whether or not an ecosystem service, in this case carbon, would occur or exist in the absence of a given activity or project. This essentially means that carbon offsets can only be claimed if, without the project, the trees would not exist.

For a project to claim revenue from a service (in this case carbon credits), additional benefits have to occur that would not otherwise happen – something that combined PES schemes should consider.

Currently, 'most PES programmes do not require that projects be additional in order to participate' (Bennett 2010). However, 'assessing additionality is necessary for a PES scheme to achieve its environmental target with economic efficiency while maintaining investor confidence' (op. cit.).

Case study:

PACKAGED SERVICES IN CAMBODIA

Cambodia's deciduous dipterocarp forests are some of the most important conservation areas in southeast Asia, home to many mammals and water birds, including the threatened Giant and White-shouldered Ibises. Deforestation, hunting and the advance of settlers into forest areas have endangered the survival of these species.

Initial conservation measures which focused on establishing various protected areas were unsuccessful, mainly due to a lack of supporting infrastructure. In 2002 a series of pilot PES schemes, supported by the Government and the Wildlife Conservation Society (WCS), were set up in the protected areas. The PES schemes are packaged to include various ecosystem services, including ecotourism, payment for bird nest protection and the production of wildlife friendly products.

Under the community-based ecotourism scheme bird watching tourists are charged for their experience – US$30 per person if all key species are viewed and US$15 if a bird watcher views one particular species. Communities thus have a vested interest in protecting bird populations. Alongside this programme, WCS pays US$5 for reports of nests of threatened species and employs local people to monitor and protect chicks. The nesting scheme is considered to have been successful: more than 1 900 nests were protected between 2002 and 2010. Meanwhile an agricultural product scheme includes measures to give local farmers greater access to markets for wildlife-friendly products in return for protecting threatened species and for limiting expansion of agricultural lands into forestry areas.

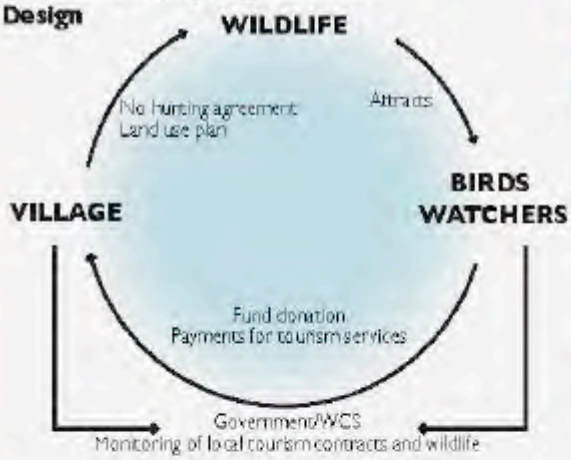
Though there are concerns about certain aspects of these schemes, including the reliance on continued outside funding for the bird nesting programme, it is felt that the packaging and combining of PES programmes has helped conservation efforts and has also provided much needed additional income to local communities (Clements *et al.* 2010).

Tmatboey, Cambodia

Region

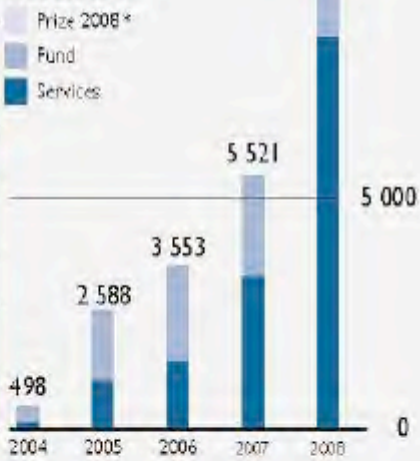
Eco-tourism programme

Design



People involved

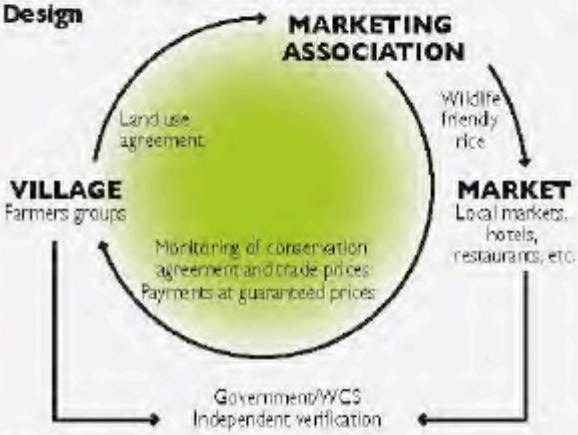
Revenues



* Tmatboey received the UNDP Equator Prize in 2008, which contributed a further US$5 000 to the fund.

Agri-environment programme

Design



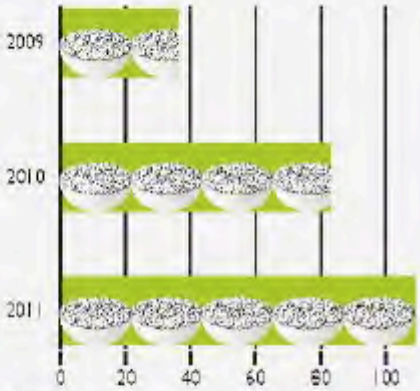
Payments, 2008

Dollars

TOTAL payments to village: 10 631

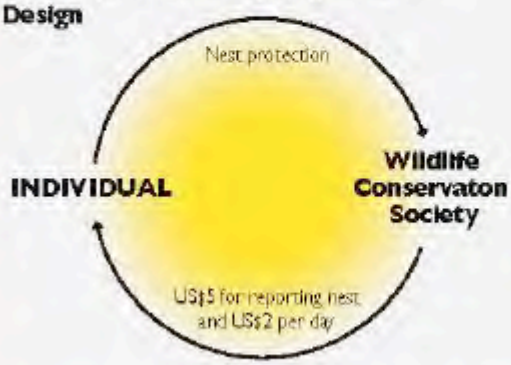
Paddy rice sold

Metric tonnes

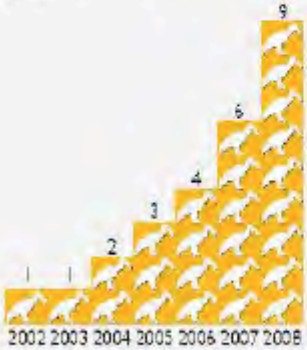


Nests protection programme

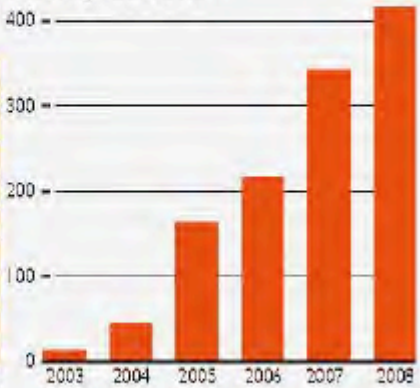
Design



White-shouldered Ibis population at Tmatboey



Nests protected



Sources: Clements T, et al. "Payments for biodiversity conservation in the context of weak institutions: Comparison of three programs from Cambodia", Ecological Economics, 2009; Clements T, et al. "Tmatboey Community-based Ecotourism Project, Cambodia", Transinks, Usaid, 2008; Nielsen K. "Wildlife friendly Ibis Rice", Wildlife friendly enterprise network, 2011.

CHAPTER 3

VALUING ECOSYSTEMS AND FIGHTING POVERTY

Stilt fishermen in the sea, Sri Lanka.

How PES can help the poor

In 2001 the World Bank defined poverty as 'pronounced deprivation of well-being'. Well-being depends on basic material needs including food, personal security, reliable social relations and freedom. The state of well-being or poverty is also dependent on other factors such as geography, environment, age, gender and culture (MA 2003).

Ecosystems and poverty

Ecosystems have an intrinsic value in the way they sustain the world in which we live. The healthy working of ecosystems is a highly complex process, involving multiple interactions between various ecosystem services. In the interaction between human activities and ecosystems, poverty is often related to ecosystem degradation and, in turn, ecosystem degradation often aggravates rather than addresses poverty.

The provision of ecosystem services is vital for all of us – particularly for the poor. When ecosystem services are disrupted the poor are generally the first to be affected: more prosperous members of society tend to have the financial and social assets to obtain resources, or their substitutes, and ecosystem services elsewhere (FAO 2011).

Poverty alleviation and ecosystem conservation: a vital linkage

Nature is a lifeline for many of the world's 1.1 billion people living in severe poverty (WRI 2005) – a vital asset for those with few material means. This is especially true for the rural poor, who make up three-quarters of all poor households worldwide.

Poverty often occurs when links between ecosystem services and human well-being have been damaged or broken. The result is the loss of essential services including provision of food, water, wood, fibre and fuel. Ecosystem conservation and poverty reduction are intertwined because the rural poor often rely directly on ecosystems for their day-to-day well-being.

A central point made by The Economics of Environment and Biodiversity (TEEB 2010) initiative is that forests, watersheds, biodiversity and other ecosystem services play a key role not only in sustaining the overall health of the planet but also in contributing to livelihoods in rural areas. Healthy ecosystems are 'the wealth of the poor'.

It has been estimated that ecosystem services and other non-marketed goods make up between 50 and 90 per cent of the total source of livelihoods among poor rural and forest-dwelling households – the so-called 'GDP of the poor' (TEEB 2010). This contrasts with various national GDP figures where, for the most part, agriculture, forestry and fisheries account for between 6 and 17 per cent of overall GDP.

Putting a monetary value on ecosystem services is part of modern science. For example Lescuyer (2007) values the services Cameroon's forests provide at US$560 per hectare per year for timber, US$61 for fuelwood, and from US$41 to US$70 for non-timber forest products. Moreover the contribution which Cameroon's forests make to climate regulation, expressed in monetary terms, is estimated at between US$842 and US$2 265 per hectare per year.

When ecosystems are threatened or degraded, then the value of the services they provide decreases. Priess et al. (2007) valued pollination services provided by forests in Sulawesi in Indonesia at US$60 per hectare per year. As more forests are cleared for palm-oil plantations and other land uses, pollination services are reduced. The knock-on effect reduces regional coffee yields by as much as 18 per cent. As a result net revenue per hectare of land is projected to drop by 14 per cent over the next two decades.

Taking part in PES schemes

There are four basic criteria governing involvement in PES schemes by low-income households and communities: eligibility to participate, desire to participate, ability to participate and competitiveness relative to other prospective sellers of ecosystem services.

To be eligible to take part in PES schemes, low-income land groups must manage land or resources which provide or could provide ecosystem services demanded by buyers. Poor people offering ecologically valuable services not in demand are unlikely to benefit from PES. Eligibility also depends on meeting rules or criteria established by the PES market or programme. For example smallholders have so far been largely excluded from the regulatory carbon market due to limitations and complex rules related to land-use-based projects under the Kyoto Protocol's Clean Development Mechanism. Furthermore, some government PES programmes have in the past imposed eligibility criteria which disadvantaged the poor, such as requirements for legal land title and minimum land holdings for enrolment in schemes (Milder *et al.* 2010). The structural, market and institutional requirements for PES schemes can make it challenging for local communities and the rural poor to be competitive when setting up or taking part in PES schemes.

Dependence on ecosystems services

Where possible, local, national and regional strategies to preserve biodiversity through the sustainable management of ecosystems should be combined with efforts to alleviate and ideally eliminate poverty. Such a dual approach coincides with the aim of achieving internationally agreed objectives such as the Millennium Development Goals.

When the poor work and live in balance with the ecosystem on which they depend, there is a higher likelihood of boosting productivity and having more direct environmental income. Through such processes people are not only helping themselves: those living well outside the immediate area can benefit too. For example, if healthy forest cover is preserved in a river catchment area, erosion can be controlled, watersheds maintained and water supplies secured, all of which are of great benefit to landowners downstream.

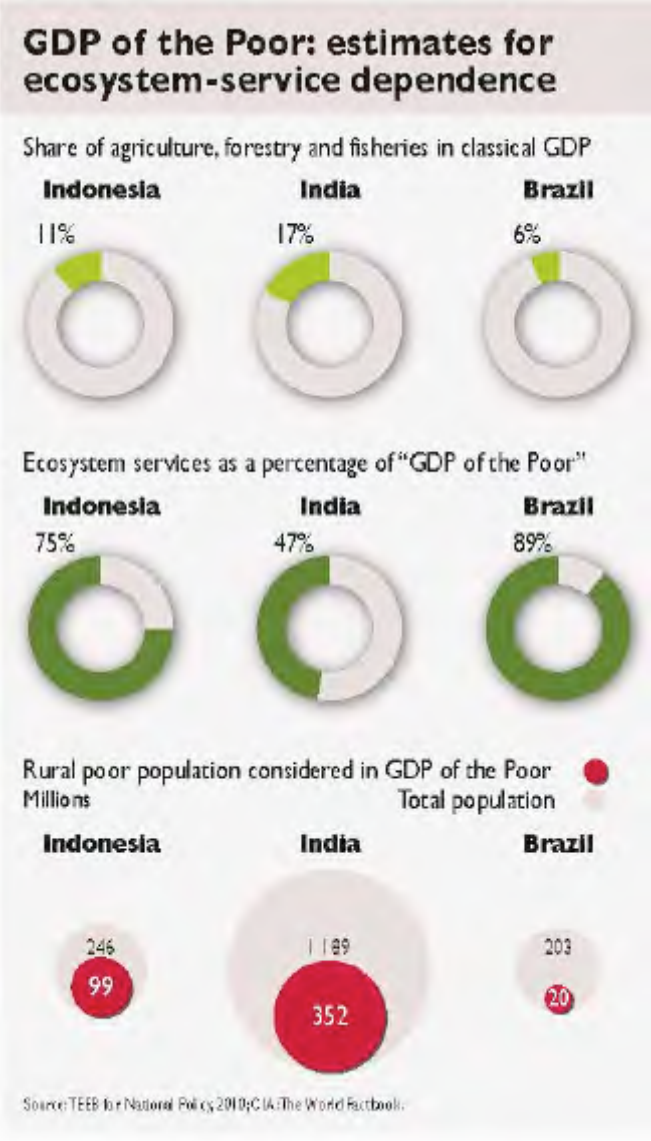
Emerging PES markets and potential benefits

PES may play a key role in helping to alleviate poverty: it has the potential to provide important benefits to poor people at the household or community level, whether in the form of cash payments or in non-cash formats such as capacity building for a transition to more profitable, resilient land-use systems, establishing secure land tenure, or strengthening social capital and supportive local institutions.

The paper *Trends and Future Potential of Payment for Ecosystem Services to Alleviate Rural Poverty in Developing Countries* (Milder *et al.* 2010), estimates that between 10 and 15 million low-income households in developing countries could benefit from markets for ecosystem services and biodiversity conservation. Millions more, it claims, could benefit in coming years from market measures targeting watershed protection, enhancing landscape beauty and providing recreational amenities. However some experts also argue that PES has primarily benefitted the rich who are already part of a working market economy.

Advantages of PES

There are both short and long-term advantages to properly run PES schemes. In the short term PES can create more benefits for poor communities: this can translate into, for example, better education and health care, and more money available either for investment to improve productivity or to buy household goods. In the long term, local ecosystems can be improved which in turn will have a beneficial knock-on effect on adjacent areas.



PES can also clarify land or user-rights and formalise resource tenure, giving local people a voice as environmental stewards of their land and community. For the first time poorer households can have options for livelihood which can generate income and maintain their wealth in the form of healthy ecosystems and the possibility to transcend a purely subsistence form of existence. Spiritual and cultural aspects of community life tied to nature will be also strengthened and preserved.

Developing PES agreements to alleviate poverty

While PES schemes are primarily about setting up and working with markets for ecosystem services – but not specifically designed to alleviate poverty – they can be an important source of income in poor areas. For example, in the Cauca

valley in Colombia US$1.5 million has been invested in forest management in poor community areas. The aim is to improve stream flows and reduce sedimentation in irrigation canals. Also in Colombia, Coca Cola pays people to maintain natural páramo vegetation in Chingaza National Park upstream from its bottling factory outside Bogota: payments help maintain vegetation, which filters water, and provide income for poor communities (TEEB, 2010).

In Kerala state, India, between 500 and 1 000 families could earn income from maintaining continued supplies of Jeevani, a commercially marketed medicine. The families will cultivate and harvest the fruit and leaves used to manufacture the drug following principles for more sustainable agriculture. Sales of the drug will also give the community ongoing royalty payments.

In southern and eastern Africa funds have been allocated for the upkeep of landscapes, natural resources and wildlife habitats. As a result ecotourism is developing in Botswana, Kenya, Namibia, South Africa, Tanzania and Zimbabwe. Such schemes employ an estimated 3 000 people directly. In all more than US$100 000 has also been reinvested in economic development and conservation activities.

Other examples of PES in action

In the town of Pimampiro, Ecuador, a user-financed PES scheme has been implemented as a result of negotiations between the town municipality and two dozen farmer families. The farmers will protect forests in upstream headwater areas, thus securing a clean water supply for the town. Payments to the farmers vary according to the condition of the ecosystem, based on a simple cost per land area model: US$1 per hectare per month for undisturbed páramo or primary forest, US$0.75 per hectare per month for older secondary forest, US$0.50 per hectare per month for new secondary forest. Farmers have signed five-year contracts on an individual basis. Local bank offices make quarterly payments to landowners. To receive payment, each landowner must sign a renewable five-year agreement with the municipality of Pimampiro (FAO 2011).

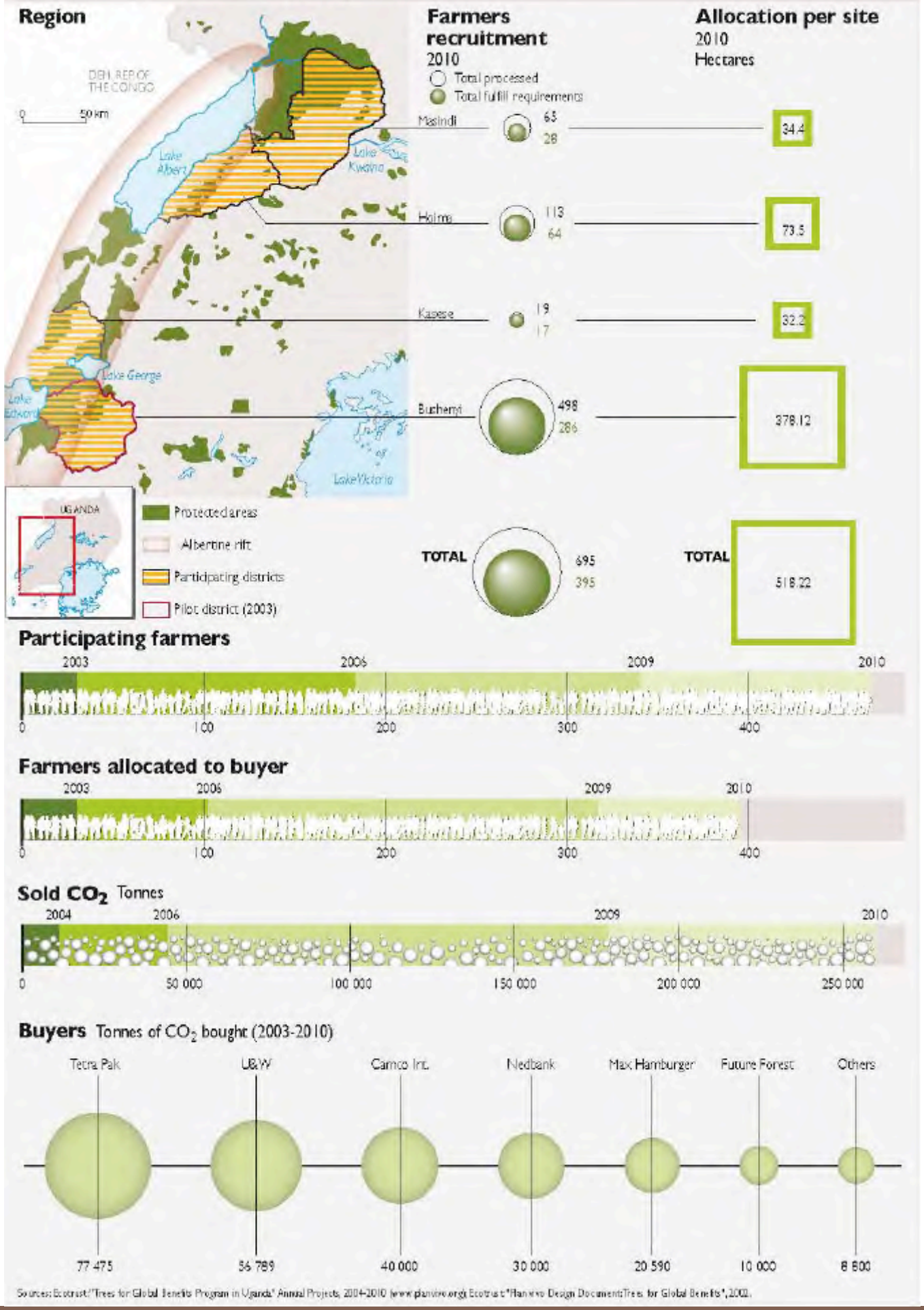
Uganda

In Mitooma-Bushenyi in Uganda, the environmental conservation organisation Ecotrust has agreed with local landowners that in exchange for planting native species they will receive payments based on the amount of carbon their trees capture. Contracts state that each hectare planted with native tree species – African cherry, musizi, funtumia and khaya – sequesters 57 tonnes of carbon over 10 years, worth an estimated US$8 per tonne. Ten per cent of credits are set aside to protect against unforeseen events. Those involved began by trading 52 tonnes of carbon for a total of $416 per hectare. Land can be used for various crops and benefits, as long as the trees stay intact. After 15 years those involved in the PES will be able to harvest the timber from the land. The carbon credits are delivered to Ecotrust which then deals with Tetra Pak UK, the credit buyers. Pricing structures are determined in compliance with the Plan Vivo system, a generally accepted standard for certifying payments for PES programmes. About 60 per cent of costs represent payment to farmers, with administration, community engagement initiatives and recruitment, local technical assistance and monitoring accounting for 30 per cent. Certification costs including registry are 6 per cent of the total and verification costs 4 per cent (The Katoomba group, 2011).

Nepal

The Kulekhani reservoir, in the Makwanpur district about 50 kilometres southeast of Kathmandu, collects monsoon rainfall from surrounding areas which is then channelled to power two downstream hydropower plants. The two plants provide 17 per cent of all the hydroelectricity in Nepal. More than 46 000 people live in the Kulekhani catchment area. Deforestation of upland areas in the past and periods of intense rain during the monsoon have caused frequent landslides, leading in turn to dramatic sediment build-up in the reservoir. This has severely reduced power production. To tackle the problem the government has promoted watershed conservation programmes, including projects employing local people to build sediment trap dams. In 2003 the World Agroforestry Centre and Winrock International – a global non-profit organisation – established a PES scheme in collaboration with the government, linking upland communities in the Makwanpur area with downstream developments at the hydropower plants. Under government regulations, the Makwanpur District Development Committee receives 12 per cent of annual royalties paid by the Kulekhani power plants to central government. The scheme specifies how this money should be allocated, with those living in upstream catchment areas receiving the largest share: in 2006-7 upland communities received US$3 000, in 2007-8 US$5 000, and in 2008-9 about US$10 000. The PES scheme has not only helped conserve upland areas and given vital additional income to poor communities: it has also raised awareness among local people about the provision and payment of ecosystem services. While the government has issued directives on imple-

Trees for global benefits, Uganda



Sources: Ecotrust: 'Trees for Global Benefits Program in Uganda' Annual Projects, 2004-2010 (www.planvivo.org); Ecotrust 'Planvivo Design Documents: Trees for Global Benefits', 2002.

Sea bleaching of fabrics on Ishigaki in Kabira Bay, Okinawa.

menting similar schemes in districts throughout Nepal, the Kulekhani PES has had its problems. Under the scheme payments are made indirectly, through government bodies. This has made the PES vulnerable to political instability and conflicts between rival local bodies with various disputes holding up ongoing implementation of the scheme (FAO 2011).

Lessons Learned

It is now clear that several basic factors need to be in place for a PES scheme to succeed. Perhaps the most important factor is to ensure that communities have a 'stake' in projects: this nurtures self-interest which in turn encourages community involvement and responsibility.

Allied to this is a need for less complexity in PES schemes. Again, individuals and communities selling environmental services must be able to enter the schemes voluntarily and understand what their responsibilities are and what benefits they will receive. More information on PES needs to be made available, both for buyers and sellers. More funding for preliminary work on assessing PES schemes is needed too, with greater efforts to match sellers of services to a range of buyers.

Implementing PES has not been helped by groups and organisations who have used questionable methods to persuade communities to sell environmental services. Typically such people offer to represent communities in negotiations on carbon-credit contracts, holding out the promise of large sums of money. There are frequent demands for community representatives to sign contracts on their first visit. This sort of unscrupulous behaviour can undermine genuine PES schemes. Less complexity in the system matched with a greater availability of information about the workings of PES can help counter such activities. More training for communities on PES will empower them to act on an equal footing, capable of negotiating with potential buyers or working with intermediaries.

Issues concerning land rights can be problematic. 'The poorest of the poor' often do not own or control any land. There are also issues relating to overlapping and disputed claims to land – as is the case in many poor communities and indigenous communities around the world – or where land is owned collectively by various groups. This highlights the need to look at the way property rights are defined and implemented through community-based use rights or access rights.

At present PES schemes are often easier – and less costly – to implement when they involve only a few big landowners. In view of prevailing practice on land and property rights, there may be a need to reconsider how PES schemes are framed and implemented, in such a way as to allow communities, not just individuals, to register as service providers too.

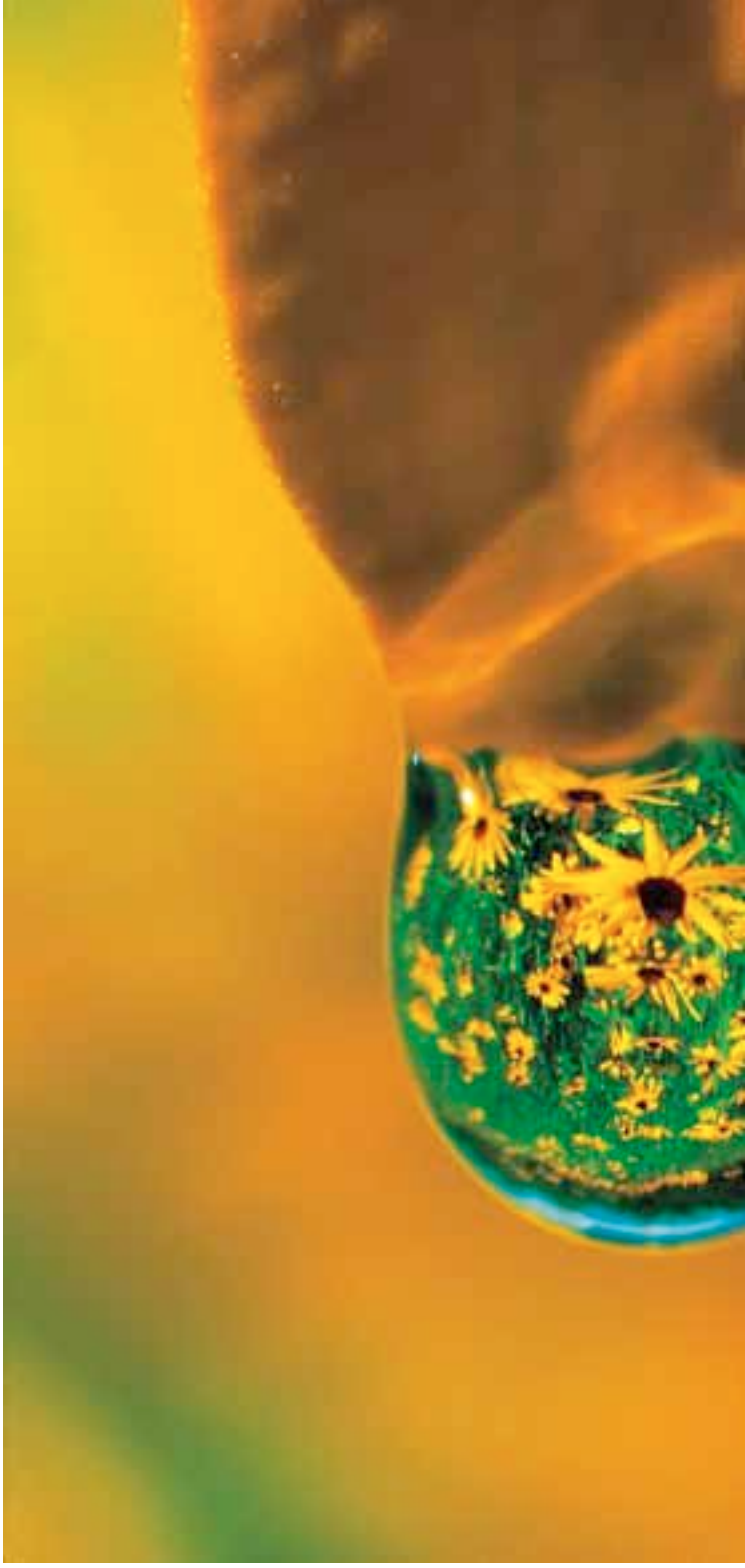
It may be important to guard against wealthy landowners using entry to PES schemes as a way of securing claims over disputed land, thus going against the interests of the poor. Another issue is that many rural poor live and work on land which is environmentally sensitive and, at the same time, economically marginal. PES pricing systems need to take this into account.

Payment systems must be transparent and the flow of funds easily traceable – not weighted in favour of either buyer or seller. It is essential to show that such payments to communities can make a difference to household incomes: otherwise people are unlikely to take part or follow through on commitments. Risk factors should be taken into consideration when framing payment proposals. Under the PES system, payments are often based on the delivery of specific ecosystem services yet adverse factors beyond the control of those selling the services such as wildfires, insect infestations or changes in rainfall might result in failure to meet contractual obligations. PES contracts should take into account the potential for such events.

Poor families are unlikely to live on PES payments alone. Depending on the context and type of PES scheme, family incomes can be supplemented through activities such as agroforestry, collection of non-timber forest products and possibly limited logging, though it is important to make sure such activities do not compromise carbon storage requirements. Additional compensation may also be provided in the form of capacity training or support for alternative income-generating enterprises

Though PES and poverty alleviation are interlinked, buyers tend to view poverty reduction as a separate issue. Asking buyers to pay an additional sum to ensure a PES programme is more pro-poor may lessen the attraction of becoming involved and could be viewed as a tax on conservation efforts. It may therefore be necessary to look for additional, specific sources of funding for schemes where a PES scheme is combined with poverty alleviation

KEY MESSAGES



KEY MESSAGES for Payment of Ecosystem services and the way forward.

Ecosystem-based economic development is needed. The current economic model driving the global economy is not sustainable. A new approach to economic development and human activities is consequently necessary, underpinned by ecosystems.

PES is a proven concept which can reduce negative economic patterns, support sustainable development and increase well-being. It is not a remedy for all ills and must be applied carefully, to avoid potential negative effects.

Governments can play a more prominent role in stimulating demand for environmental services and promoting different markets by establishing comprehensive regulatory and enabling frameworks.

Targeted institutional design is needed to support PES schemes. This includes efforts to identify and match the providers and beneficiaries of ecosystem services.

Non-existent or ill-defined land rights can hamper PES. The poorest of the poor often do not own or control any land. There are also issues relating to overlapping and disputed claims to land or where land is owned collectively by various groups.

Many PES schemes tend to focus on a single ecosystem service. However, integrating various ecosystem services could lead to more viable PES schemes. Functioning schemes seem to be moving towards a bundled approach.

Scope for assessing market prices for environmental services differs greatly from one market segment to another. In the carbon sequestration market, commodities can be traded, but economic valuation in the landscape beauty and biodiversity markets is far more challenging. This should not lead to the 'easier' ecosystem services gaining more importance.

There are great differences in the pricing of services within each market segment. The development of prices should include the best available science, but most importantly, it needs to be based on mutual understanding between the service provider and beneficiary.

It is essential for actors to understand the value of conserving ecosystems. Individuals and communities providing or selling environmental services must be able to understand what is entailed and how they will benefit.

Water droplet on petals of a black-eyed susan

Trust among actors is a factor that should not be underestimated when setting up PES schemes, particularly in environments where the availability or acceptance of science is low.

Given the complexity of PES, more work is required to assess the viability and effectiveness of PES schemes. Similarly greater efforts must be made to develop tools and guidelines for establishing PES schemes.

Training all stakeholders is a prerequisite to achieving a holistic grasp of the full potential and implications of PES schemes and their deployment.

One of the most important factors for a successful PES scheme is to ensure that each project brings clear benefits to individuals or communities, nurturing self-interest, which in turn encourages community involvement and responsibility.

Although PES and poverty alleviation are interlinked, buyers tend to view poverty reduction as a separate issue. Asking buyers to pay an additional sum to ensure a PES programme is more pro-poor may make involvement less attractive. It might even be seen as a tax on conservation efforts. It may therefore be necessary to look for additional, specific sources of funding for schemes where a PES scheme is combined with poverty alleviation.

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Glossary

(Based on the TEEB Synthesis Report, 2010)

BIODIVERSITY: the variability among living organisms, including terrestrial, marine and other aquatic ecosystems. Biodiversity includes diversity within species, between species and between ecosystems.

ECOSYSTEM SERVICES: the direct and indirect contributions of ecosystems to human well-being. The 'ecosystem goods and services' concept is synonymous with ecosystem services.

GOVERNANCE OF ECOSYSTEMS: the process of regulating human behaviour in accordance with shared ecosystem objectives. The term includes both governmental and non-governmental mechanisms.

HUMAN WELL-BEING: a concept prominently used in the Millennium Ecosystem Assessment – it describes elements largely agreed to constitute 'a good life', including basic material goods, freedom and choice, health and bodily well-being, good social relations, security, peace of mind and spiritual experience.

INCENTIVES (DISINCENTIVES), ECONOMIC: a material reward (or punishment) in return for acting in a particular way which is beneficial (or harmful) to a set goal.

INTRINSIC VALUE: the value of someone or something in and for itself, irrespective of its utility for someone else.

NATURAL CAPITAL: an economic metaphor for the limited stocks of physical and biological resources found on earth and of the limited capacity of ecosystems to provide ecosystem services.

RESILIENCE (OF ECOSYSTEMS): their ability to function and provide critical ecosystem services under changing conditions.

TOTAL ECONOMIC VALUE (TEV): a framework for considering various constituents of value, including direct use value, indirect use value, option value, quasi-option value and existence value.

VALUATION, ECONOMIC: the process of estimating a value for a particular good or service in a certain context in monetary terms.

Regulation of water timing and flows

Natural hazard mitigation

Recrea

Biochemicals, natural medicines and pharma

Maintenance of soil quality

Biomass fuel

Educational and inspirational values

Pest mitigation

Disease mitigation

Erc

Genetic

GRID ARENDAL