

# *Conservation Economy Backgrounder*



the  
**katoomba**  
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THE KATOOMBA GROUP'S  
**Ecosystem Marketplace 2007**

# ***Conservation Economy Backgrounder***

## ***Ecosystem Services***

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## ***Payments for Ecosystem Services***

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*Ecosystem services, environmental derivatives, ecological thresholds, economic externalities, schemes, markets, market-based schemes...Confused? Frustrated? Bored? We don't blame you.*

*Discussions of emerging environmental markets and conservation payment programs often feel like an impenetrable swamp of acronyms and lingo. Ecology, economics, law, policy and business are all highly complex subjects, and charting the connections between them can be difficult. We have prepared this guide to help you understand how environmental markets work and to direct you to areas of the Ecosystem Marketplace that will interest and further educate you:*

## **Ecosystem Services**

### **What are ecosystem services and why do we need them?**

In our daily lives, we depend on manufactured goods—such as shoes and microchips—as well as services, such as electricity, banking, and the internet, to conduct everyday tasks. Just as businesses manufacture goods and provide services, so does nature.

Nature's goods are so obvious that they are often overlooked or taken for granted—including the food, fuel and fiber that we use to produce the microchips and the buildings. Nature's services are even more basic, and less often recognized for their importance. Some of the many life-support services that wetlands, forests, grasslands and oceans provide to people around the world, day in and day out, are highlighted below:

- \* water filtration
- \* climate regulation
- \* nutrient cycling
- \* pollination
- \* pest control
- \* disease regulation
- \* flood control

### **Why are ecosystem services being lost?**

Unfortunately, as the global population swells by approximately 146 people every minute, the human strain on terrestrial, marine and freshwater ecosystems is causing some of nature's life support services to falter.

Watersheds scoured of vegetation by deforestation are losing their ability to filter water, wetlands chomped up by new developments are no longer able to control floodwaters when heavy rains hit, and the loss of natural habitat is causing the decline of wild pollinators essential to agriculture. Perhaps most perilous of all, the global thermostat is fluctuating (fueling extreme weather events) as the ability of forests and oceans to absorb heat-trapping gases is depleted.

There is a growing global awareness of the services that natural ecosystems provide. Still, the value of these ecosystem services and the long term costs of their loss are rarely taken into account in decisions about how natural resources are used, or into calculating their 'cost'. Because these day-to-day management decisions often focus only on short-term financial returns, the ecosystems that provide these services are often degraded, sometimes in ways that irreparably reduce ecosystem service production.

Fortunately, concern over the loss or damage to ecosystem services is driving innovation. Ecosystem service transactions are emerging around the world, with the goal of placing a financial value on the benefits that these services provide, in order to promote their maintenance.

Hoping to call attention to the loss of nature's life support services and reverse this trend, various sectors of society (scientists, non-profits, academics, and some businesses) have recently begun doing three things:

- \* First, they are beginning to give nature's services a name;
- \* Second, they are beginning to measure them; and
- \* Third, they are trying to convince global society to pay for and invest in them.

The first step was fairly easy...the second and third steps are proving more difficult.

### **Step One: Defining nature's services**

In the late 1990s, a group of ecologists and economists collaborated on an effort to assign value to nature's services. In sum, they estimated that nature's services were worth some \$33 trillion per year. Since the number was almost twice that of the global gross national product at the time (\$18 trillion in 1997), the finding generated a global buzz and a generous dose of controversy. The term ecosystem services came into widespread use in the ensuing dialogue and, formalizing the term in a 1997 publication, the Ecological Society of America explained that ecosystem services, "refers to a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life."

#### **Ecosystem Services: Provisioning, Regulating and Cultural**

Source: Millennium Ecosystem Assessment:

<http://www.millenniumassessment.org/documents/document.356.aspx.pdf>

#### **Provisioning**

Food; Fiber; Genetic Resources; Biochemicals, natural medicines, pharmaceuticals; Fresh water

#### **Regulating**

Air quality regulation; Climate regulation; Water regulation; Erosion regulation; Water purification and water treatment; Disease regulation; Pest regulation; Pollination; Natural hazard regulation

#### **Cultural**

Spiritual and religious values; Aesthetic values; Recreation and ecotourism

While it is worth noting that nature's services, environmental services, ecological services and ecosystem services all refer to the same set of services, ecosystem services is the most widely accepted of these terms and so is the one we use regularly on the Ecosystem Marketplace.

### **Step Two: Measure ecosystem services**

Once ecosystem services had a name, the next step was to refine measurements of their quantity and value. In many respects, efforts to quantify ecosystem services are still in their infancy. Ecologists, nonetheless, have made huge strides toward effectively measuring ecosystem services in the last decade.

A recent paper published by Claire Kremen of the University of California at Berkeley, for instance, cited 13 scientific studies that quantified ecosystem services ranging from the dung burial of beetles to the carbon storage of trees. The first global survey of ecosystem services the Millennium Ecosystem Assessment was also completed in 2005, mapping the physical flow of ecosystem services throughout the world and tracing their connection to human well being at a variety of scales.

Importantly, once you've located and measured services, valuing them becomes much easier. New research suggests that the value of greenhouse gas storage in some forests can be as high \$2,200 per hectare. Similarly, a study of coral reefs in the Caribbean suggests that the aesthetic value of intact reefs may be worth just over \$2 billion annually to the coral-based tourism industry.

Add it all up and Klaus Toepfer, the former head of the United Nations Environment Program argued that, "Conservation of habitats and ecosystems are cost effective when compared with the short term profits from environmentally damaging activities like dynamite fishing and sedimentation as a result of deforestation."

Toepfer may well be right, but saying that something has value is much easier than actually convincing someone to pay for it, which is why step three is the hardest part in the fight to preserve the world's ecosystem services.

### ***Step Three: Pay for and invest in ecosystem services***

We have little trouble understanding that the manufactured service of electricity is valuable to us, so why don't we think of the ecosystem service of watershed filtration as being valuable too?

We pay for electricity because, when we don't, it is shut off. A company has to produce it, and that company invests in the buildings, dams, turbines, and computer systems that allow it to generate electricity. Without the company's investment in this infrastructure, no electricity would be produced. We understand that and so, grudgingly, we pay our electricity bills each month.

On the other hand, we don't pay for water filtration because, until very recently, we haven't needed to pay for it. Month after month, year after year the root structures of trees and plants have been providing this service to us free of charge. We didn't pay, but the service continued.

Generally, we don't pay for things that can be had for free. And since no one is paying for ecosystem services, businesses haven't thought to invest in providing them.

To make matters worse, we have no problem valuing ecosystem goods like timber or gold or oil or food, so we tend to invest in extracting ecosystem goods even when it means destroying ecosystem services. This system of valuing nature leads to economic decisions favoring the consumption of ecosystem goods over the conservation of ecosystem services.

Once you really understand the problem, it is fairly easy to see where the solution lies – market forces must be realigned to invest in the production of both goods and services. And both the costs of damaging ecosystems and the benefits of conserving them need to be factored into economic decision-making. If the global economy can be tweaked so that market forces reward investment in ecosystem services, a positive feedback loop will start in which increased investment in ecosystem services leads to increased production of ecosystem goods, eventually fueling both sustainable economic growth and ecological restoration.

While this solution seems fairly simple, it represents one of the biggest scientific, economic and social challenges of our time.

Can we tweak the global economy so that it provides for sustainable resource consumption and the perpetual conservation of ecosystem services?

A global band of pioneers made up of scientists, economists, lawyers, policymakers, community leaders, businessmen and individual consumers is currently trying to ensure that the response to this question is a resounding "yes".

### ***Payments for Ecosystem Services***

Today, formal, multi-billion dollar markets exist for trading greenhouse gas reduction credits and allowances, wetlands credits, water pollution credits, and even endangered species habitat credits. Where formal markets are premature, varied systems of compensation are being established for specific services provided by ecosystems. Payments for Ecosystem Services (PES) may also play a role in improving the quality of regulatory decision making by giving economic value to ecosystem services that

may previously have fallen outside formal markets. PES mechanisms would thus incidentally also play an important role in helping to factor the full range of costs and benefits into economic valuations supporting planning and regulatory decision making. Overall, PES is just one of many instruments that can provide incentives for maintaining and restoring ecosystem services, but it is a mechanism with great potential and increasing interest among both the private and public sectors.

This section outlines some of the innovative efforts to create a new economy for ecosystem services and gives an overview of the many different policy tools being used to realign economic incentives so that they reward the restoration and/or conservation of ecosystem services.

## **What are environmental markets, ecosystem markets and payments for ecosystem services?**

In its strictest sense, a market is a regular gathering of people (whether in person, on the internet, or via other forms of communication) for the purpose of buying and selling goods and/or services. The emphasis is on the term regular. If the gathering is between two people, and it only happens once, and is the only one of its kind, then it is not a market.

Environmental markets, ecosystem markets and Payments for Ecosystem Services (PES) are all terms that are used to refer to the entire suite of economic tools used to reward the conservation of ecosystem services. Confusingly, each of these terms also refers to a more specific subset of these tools.

People use the term environmental markets loosely to mean all markets that have been set up to fuel environmental improvements of some kind. Markets for renewable energy, sulfur dioxide emissions reductions and organic food might all be termed environmental markets. Ecosystem markets is a slightly narrower term that usually refers only to those markets that trade permits or credits related to ecosystem services. The trouble comes when the moniker "environmental market" or "ecosystem market" is used to describe conservation payments that aren't really part of a "market."

## **What kinds of payments are being made for ecosystem services?**

Payments for ecosystem services (PES) include both monetary and non-monetary transactions. Some PES transactions provide other forms of compensation for ecosystem services, such as strengthened property rights or temporary permission to actively manage the ecosystem involved. Transactions generally include either an individual or a group of people who provides services ("sellers") and an individual, or a group, who pays (or compensates) for the maintenance of these services ("buyers").

The key characteristic of these buyer/seller transactions is that the focus is on maintaining, restoring or enhancing a flow of a specified ecosystem service, such as water filtration, biodiversity protection, and/or carbon sequestration. In order to ensure that sellers supply ecosystem services to the satisfaction of buyers, PES transactions sometimes require sufficient (and often regular and/or independent) monitoring and verification of sellers' actions and their corresponding impact on the service being provided. Overall, the key attributes of ecosystem service payments are that sellers (a) are seen to maintain and provide specific ecosystem structures and functions, and (b) remain accountable, ultimately to the buyers, for ensuring that the service being bought, is delivered. Payment in other words, is contingent on delivery of the services being bought.

Payments for ecosystem services do not include monetary transactions in which there is no specific requirement that the recipient of the funds either provides the services or carries out actions that are believed by the buyer to lead to the provision of the service. For example, if a community were to allow a conservation organization to use and manage their historical common property for wildlife protection and revenue sharing, it would not necessarily be a payment for ecosystem service. In this case, the community is not specifically taking action (and/or foregoing other practices) to maintain a particular set of ecosystem services. It would, however, be a PES transaction if there were a clear agreement on both sides of the deal that the community would be compensated for limiting the activities on the ecosystem in a way that increased the quantity or quality of the services being bought and sold.

These kinds of transactions in which sellers are required to undertake actions that will maintain or restore ecosystem services have grown substantially over the past 20 years, particularly around three kinds of services:

- 1 Carbon sequestration and storage,
- 2 Water-related ecosystem services, and
- 3 Biodiversity conservation.

A brief overview of the current status of these payment systems is provided below. In general terms, carbon is considered to be a 'global' market, in the sense that the buyer of the carbon emission reduction credit can be located anywhere, as can the seller. Watershed markets and transactions are more often expected to take place either regionally or locally, since the water benefits from a land use practice typically extend the range of the watershed, and not farther. Payments for biodiversity protection originate at the international level, as well as on more local scales.

## Carbon Sequestration and Storage

*"Wall Street likes huge markets and the carbon market could shape up to be the largest commodity market in the world."*

*- Mark Tercek, Managing Director, Goldman Sachs*

*(Keynote Speech, Katoomba Group Meeting, Portland, Oregon, June 2006)*

In a way, all carbon markets are markets designed to protect a particular global ecosystem service: the service of climate regulation. However, the mechanisms by which these markets operate can be complicated and sometimes don't involve particular ecosystems at all. In fact, the majority of global carbon transactions are for reduced emissions from industrial processes rather than for the protection of a particular ecosystem. This is why the carbon market of most relevance to ecosystem services is the Land Use, Land Use Change and Forestry (LULUCF) sector. This 'market' deals with transactions through which the carbon dioxide removed from the atmosphere and sequestered in biomass generates greenhouse gas reductions. These reductions are calculated into Emissions Reductions Credits that can be sold.

Greenhouse gas offsets, also known as carbon credits, are marketable certificates representing quantifiable reductions in the amount of greenhouse gas emissions to the atmosphere. There are two main ways that greenhouse gases can be reduced: by introducing new technology that will cut the amount of gases emitted (i.e. devices that "scrub" the carbon out of industrial emissions; cook stoves that burn wood more efficiently; or electricity generating plants that burn the methane emitted by rotting waste), or through activities that will take these gases out of the atmosphere and store or "sequester" them (i.e. planting trees in deforested areas; introducing agroforestry systems or low-till agricultural practices; or conserving forests that would otherwise be cut). These greenhouse gas-reducing activities, the theory goes, can be used to cancel out the effects of, or "offset", excess greenhouse gas emissions anywhere else in the world. GHG offsets and carbon credits are generally sold as tons of carbon dioxide (CO<sub>2</sub>) or carbon dioxide equivalent (CO<sub>2</sub>e), with each credit representing a pollution reduction of one metric ton worth of CO<sub>2</sub>.

Since forests play an important role in the carbon cycle and are significant reservoirs of organic carbon, the carbon markets are an important source of potential funding for those interested in forest conservation. Tropical deforestation and land-use changes contribute roughly a quarter of all global carbon dioxide emissions into the atmosphere each year. Indonesia and Brazil, for example are among the largest emitters of GHG in the world, primarily related to land use changes in those countries. Therefore, forestry activities such as restoration, regeneration and agroforestry (not to mention avoided deforestation), are a critical means of mitigating climate change. Projects which reduce greenhouse gas emissions, such as the introduction of wood-conserving cook stoves or small-scale biogas generated electricity plants, also offer a potential means of generating GHG credits.

Driven both by existing regulations limiting GHG emissions and the anticipation of future regulations, the market for greenhouse gas reductions is currently the most robust of all ecosystem service markets. Despite the fact that carbon credits and trading from forest based activities accounts for around 1% percent of the carbon traded in regulator compliance markets (such as the EU Emissions Trading

Scheme and the Kyoto Protocol's Clean Development Mechanism), it amounts to nearly 36% of voluntary carbon trades. Engaging with this market currently can be done through specific retailers and brokers who are seeking projects in which to invest their buyers' offset contributions, including NGOs working with land owners. Key sectors of this market (known as the carbon market) include:

- 1 **The Compliance Carbon Market**, which is comprised of the regulated cap-and-trade carbon markets around the world. These markets exist in countries that have set specific limits, or "caps", on the quantity of green house gases their industries are allowed to emit into the atmosphere every year. If they emit more than their limit, they must purchase GHG offset credits. This is referred to as a "Cap & Trade" system.

The international agreements made under the Kyoto Protocol underpin most of the compliance carbon markets, although it is directly concerned only with the one of the biggest (by volume, though not in dollar terms) of these markets. Ratified by 163 countries, the Protocol is a legally binding treaty committing industrialized countries to reduce their greenhouse gas emissions. In the first commitment period of the Kyoto Protocol (2008-2012), credits from activities that avoid carbon emissions from such as avoided deforestation in tropics, are not considered. All forestry deals entering the regulated carbon market therefore relate to reforestation and afforestation as defined by the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM traded around \$5 billion worth of carbon credits in 2006.

Experts estimate that by 2010 the global compliance carbon market could be up to US\$270 billion. Of the estimated US\$30 billion transacted on global carbon markets in 2006, most money (\$24 billion) is currently being transacted through the European Union's Emissions Trading Scheme (EU-ETS), the largest regulated carbon market in dollar terms. Currently, the EU-ETS does not allow offset credits produced by forestry activities to enter its market.

- 2 **The Voluntary Carbon Market**, is a sector through which a growing number of companies and organizations are making voluntary investments to offset greenhouse gas emissions from their activities. These investments include "green" renewable energy projects as well as the purchase of offsets produced through a range of land-use options that sequester carbon, including forestry projects. The largest formal trading platform for the voluntary carbon market is the United States-based Chicago Climate Exchange. All other voluntary carbon transactions are conducted between individual buyers and sellers (either directly or through retailers or brokers). Some transactions are recorded in specialized registries such as Environmental Resources Trust's Greenhouse Gas Registry, lending transparency to the transactions, helping to avoid repeated sales of credits. A study conducted by the Ecosystem Marketplace found that in 2006, some 23.7 million tons of CO<sub>2</sub> were transacted on global voluntary carbon markets. This amounted to a total of \$91 million US dollars. Of this, \$36.1 million was transacted on through the Chicago Climate Exchange, while \$54.9 million was transacted via over-the-counter (OTC) trades. While this is almost certainly an under-estimate of the real numbers (we were being conservative), it shows that the voluntary carbon markets are growing at a very rapid pace.

**Table 1: Keeping Up with Kyoto? The Voluntary Markets in Context**

	2006 Volume (Million tCO <sub>2</sub> )	2006 Value (US\$ Million)
Voluntary OTC Offset Market	13.4	54.9
CCX	10.3	36.1
<b>Total Voluntary Market</b>	<b>23.7</b>	<b>91</b>
<b>Other GHG Trading Schemes</b>		
EU ETS Trading Scheme <sup>2</sup>	1,101	24,357
Primary Clean Development Mechanism	450	4,813
Secondary Clean Development Mechanism	25	444
Joint Implementation	16	141
New South Wales	20	225

Source: State of the Voluntary Carbon Markets 2007 – Picking up Steam. Katherine Hamilton, Ricardo Bayon, Guy Turner, Douglas Higgins. New Carbon Finance and the Ecosystem Marketplace, July 2007.

**Examples of Carbon Sequestration Forestry Projects:  
From Mexico to Uganda**

In **Mexico**, the Scolel Té project has allowed companies, individuals and institutions to offset their greenhouse gas emissions through purchasing emissions reductions from agricultural and forestry projects in Chiapas, Mexico's poorest state. For example, the International Federation of Automobiles purchases credits from a Mexican trust fund called Fondo BioClimático, which provides small-scale farmers with the technical assistance needed to switch from swidden agriculture to agroforestry. Projects include tree-based "living" fences, shade grown coffee, plantations, tree enriched barren areas, and intercropping of forestry and agricultural crops. In 2002 the carbon benefits generated by these enterprises generated roughly US\$180,000 through the sale of its carbon credits. Of the sale price, 60% is assigned to farmers and communities for the implementation of forest activities and 40% goes to technical, financial, legal and administrative support. The improvement of local livelihood is not huge but considerable (each family gets \$300 to \$1,800 per year). In addition, the plantings contribute to the preservation of the region's rich biodiversity and provide income to farmers to cover the costs of implementing new farming systems, purchasing foods and medicines, and improving households.

In **Uganda**, farmers in the village Bitereko have entered into a contract with ECOTRUST, a Ugandan NGO, to sell the rights to the carbon sequestration generated by planting native species of trees on their land. Beatrice Ahimbisibwe is one of those farmers. She agreed to clear and plant a hectare of her land with native species of trees. In return, experts determined she would generate 57 tons of carbon sequestered over ten years (assuming the trees survived) and would be paid US\$8 per ton, for a possible total of \$456 over 25 years. Additionally, Ahimbisibwe would be able to recoup any other benefits from the land, as long as the trees themselves weren't harmed: she could let her goats graze the land, she could use any wood pruned from the trees and, after some 15 years, she could use/sell the wood.

In order to protect against unforeseen eventualities (related to loss of carbon sequestration), all program participants also agreed to set aside 10% of their carbon. For the carbon she sells, Ahimbisibwe will be paid \$416 in installments. The first installment of 30% (or around \$120) would be paid up-front, once the land was planted. Thereafter, the plantings would be monitored and payments would be made as follows: 20% 1 year after planting the whole plot, 20% in year 3, 10% after year 5, and 20% after year 10.

For more information see Ecosystem Marketplace articles:

Lartigue, Cecilia 2006. "Scolel Té Puts a Human Face on Carbon Finance."

[http://ecosystemmarketplace.com/pages/article.news.php?component\\_id=4481&component\\_version\\_id=6563&language\\_id=12](http://ecosystemmarketplace.com/pages/article.news.php?component_id=4481&component_version_id=6563&language_id=12), and

Bayon, Ricardo. 2005. "From Ugandan Schoolteacher to International Carbon Consultant: A Profile of Beatrice Ahimbisibwe."

[http://ecosystemmarketplace.com/pages/article.people.profile.php?component\\_id=4000&component\\_version\\_id=6451&language\\_id=12](http://ecosystemmarketplace.com/pages/article.people.profile.php?component_id=4000&component_version_id=6451&language_id=12)

## Watershed Protection Services

*"...When you talk about water, it is a unifying element. Everyone cares, so people are willing to work to conserve it."*

*- Marta Echavarría, Founder and Director of Ecodecisión, Ecuador*

Watershed services are provided by well-functioning ecosystems for maintaining:

1. Evenness of flow of water during dry and wet seasons,
2. Good water quality (reduced sediments and/or chemical and biological pollution) of the resource,
3. Aquatic productivity for freshwater or marine fauna and flora.

Payment for these watershed services may emerge in areas where there are:

1. bilateral interactions—such as hydroelectric power generators, irrigators, municipal water systems, and industry—which are directly and significantly impacted by upstream land use, therefore are willing to pay upstream providers for maintenance of watershed, and
2. market-like mechanisms where quantities of a given pollutant into a watershed are capped and those who emit more than their cap can make a payment to those who emit less, or pay third parties to "offset" these emissions (or pay a fine to the regulatory body). In a way, this latter approach is very similar to the cap-and-trade approach associated with carbon markets.

Payments for watershed services are site- specific. The complexity of hydrological functions that imply an interaction of multiple factors such as rainfall, soils, vegetation, geological substrate, slope and land use practices.

In terms of buyers, payments for watershed services can be grouped into three overarching categories, as listed below.

1. Public **payment schemes**, which are the most numerous. They exist in Colombia, Brazil, Costa Rica, México, El Salvador, China, and South Africa, among other countries,
2. **Self-organized private deals**, numerous, although information is largely proprietary and there has never been a full assessment of these types of transactions, and
3. **Open trading schemes**, such as nutrient trading, are currently being attempted in the U.S., New Zealand, and a few other countries.

## Biodiversity Protection Services

*“Our shared natural environment - especially in relation to issues of climate change and biodiversity - is under strain. We can no longer take its resilience for granted. There appears to be an acceleration of warning signals that we ignore at our peril.*

*But in saying this, I am not adopting an anti-development stance. We have to find means of accommodating the development needs of the high proportion of people who live in poverty and who are also typically the ones who are most vulnerable to the impact of environmental degradation.”*

*– Sir Mark Moody-Stuart, Chairman of Anglo American PLC*

Market mechanisms to pay for other ecosystem services—such as watershed services, carbon sequestration or storage, landscape beauty and salinity control—can be designed to conserve biodiversity as well. The unique challenge, however, with payments for biodiversity services is the need to consider a kaleidoscope of elements that are essential for diverse, interdependent species to thrive.

The obstacles are being addressed, though, and payments for biodiversity services are emerging, such as:

1. **Land Markets for High-Biodiversity-Value-Habitat**, which are being purchased by a range of buyers including:
  - national governments, in order to expand or form of parks and protected areas;
  - non-profit conservation organizations, such as The Nature Conservancy, and
  - individual conservationists, such as Yvon Chouinard's significant land purchase in Patagonia.
2. **Payments for Biodiversity Use or Management**, by paying landowners to manage their assets so as to achieve biodiversity or species conservation, such as:
  - government agro-environmental payments made to farmers in North America, Europe, or China for conservation (in the US this is sometimes in the form of easements), and
  - management contracts focused on the conservation of aquatic and terrestrial wildlife habitat.
3. **Payments for Private Access to Species or Habitat**, often related to accessing particular species or habitats, but which, in practice, cover some or all of the costs of providing broader ecosystem services, such as agreements that have been made with:
  - pharmaceutical companies contracting for bio-prospecting rights in tropical forests,
  - ecotourism companies paying forest owners to bring tourists onto their lands to observe wildlife, and
  - private individuals paying forest owners to hunt, fish, or gather non-timber forest products.
4. **Tradable Rights and Credits within a Regulatory Framework**, such as the United States' wetlands mitigation program in which developers seeking to destroy a wetland must offset that by buying “wetland credits” created by “protecting, enhancing, or restoring” wetlands “of similar functions and values” in the same watershed being damaged. Referred to as “wetland mitigation banking”, this process has led to the creation of private sector companies dedicated to restoring wetlands and selling the resulting “credits”. For the last 15 years, the U.S. has also seen the creation of a similar approach related to the protection of endangered species (known as “conservation banking” or “species banking”). Although there are no reliable figures, the Ecosystem Marketplace estimates that in the U.S. alone, there are \$3 billion dollars spent on wetland mitigation in any given year. Of this, about \$1 billion is in the form of for-profit wetland mitigation banking.
5. **Biodiversity-Conserving Business**, such as eco-labeling schemes—including the \$21 billion certified organic agriculture market—that advertise or certify that products were produced in ways

consistent with biodiversity conservation. International organic standards are expanding to landscape-scale biodiversity impacts. It is important to note, however, that sometimes the premiums being paid by consumers for goods that are labeled “organic” or “Bio” in various markets is not necessarily simply being spent to conserve biodiversity. In some cases people choose organic products because they believe they are better for their health, so the exact amount that is being spent specifically on biodiversity conservation is hard to tease out from some of these labeling schemes. In the case of schemes such as the Forest Stewardship Council (FSC) for wood and forest products, the links to biodiversity conservation tend to be more direct.

### ***Conservation Banking in the United States***

Under the Endangered Species Act (ESA) in the United States, it is illegal to undertake any development activity that will “take”—including: harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect—a species listed as endangered or threatened under the ESA, without first obtaining “incidental take authorization” through section 7 or 10 of the ESA from the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). Section 10 of the ESA requires the landowner to prepare a Habitat Conservation Plan that, among other things, must “minimize and mitigate the impacts” of the activity to receive an incidental take permit.

Conservation banking in the US was born in the early 1990's, when the state of California became concerned with the fate of a species of bird, the California coastal gnatcatcher, due to increased development on the bird's habitat. The State decided that the solution was to protect those areas of coastal sage scrub that, because of their size, location and ecology were particularly valuable for the gnatcatcher.

In 1993, a number of coinciding events led to the innovation of conservation banking. The gnatcatcher was added to the state's endangered species list at the same time that Bank of America - one of the world's largest banks - foreclosed on a 263-acre site in San Diego County known as the "Carlsbad Highlands". This property was important habitat for the gnatcatcher and the bank found that its development options for the site (and therefore its ability to sell the land) were limited. If it wanted to build on the land, it would have to pay large sums to mitigate its damage to gnatcatchers. The return would not necessarily cover the bank's costs. So Bank of America decided to look for other ways of obtaining value from its land. Also at this time, the California Department of Transportation (CalTrans) found that it, too, had a problem with gnatcatchers. It was building a highway on prime gnatcatcher habitat and, given the bird's new endangered status, the agency was obliged to mitigate the damage its project might cause. The stage was set for a deal.

CalTrans agreed to pay Bank of America an undisclosed sum to put a conservation easement (so that the area would never be developed) on 83 acres of its property, in return for a number of gnatcatcher mitigation credits. By 1995, the Carlsbad Highlands became the state's first conservation bank. It has since sold all of its available mitigation credits (about 180) at between US\$10,000 and US\$15,000 a piece. Today, in San Diego County, similar mitigation credits sell for upwards of US\$25,000 each.

Excerpted from: ten Kate, Kerry, J. Bishop and R. Bayon. 2004. Biodiversity Offsets: Views, experience and the business case. <http://www.forest-trends.org/biodiversityoffsetprogram/BBop%20library%202/International/Not%20Printed/BioDiv%20Offsets%20-%20Views,%20Experience.pdf>

## **What are the different economic tools that fall under the term PES (Payments for Ecosystem Services)?**

We will now look at the various economic tools in the policy toolbox today. It is important to note that each of these operates in distinct ways, depending on the service provided, political context, and social environment. There are six main tools currently in use:

1. **Direct Public Payments** are government payments for the protection of specific ecosystem services through sustainable land and forest management practices. These deals involve direct payments from a government agency, or another public institution, to forest landowners and/or managers. Payments may be standardized or negotiated individually. This form of payment for ecosystem services is the most common, with governments around the world paying rural landowners to steward their land in ways that will generate ecosystem services. The Conservation Reserve Program in the United States, for instance, pays out over US\$1.5 billion to farmers each year in exchange for their protection of endangered wildlife habitat, open space and/or wetlands (see Green Payments and American Agriculture). China has a similar multi-billion dollar program in place to fund erosion control (see Grain for Green), while Mexico and South Africa target their payments toward stewards of watershed services (see Mexico Forest Fund; Ecosystem Farming the precursor of markets in South Africa?; Betting On Markets)

*The Public Redistribution Mechanism in Parana, Brazil is another example of a public payment. The State allocates additional funds to municipalities which protected forested watersheds and rehabilitated degraded areas. Also in Parana, and Minas Gerais, 5% of the revenues received from the Circulation of Goods and Services (ICMS), an indirect tax charged on the consumption of all goods and services, is distributed either to municipalities with conservation units or protected areas, or to municipalities that supply water to neighboring municipalities. The State allocates more revenues for those municipalities with the greatest amount of area under environmental protection.*

2. **Self-Organized Private Deals** are direct transactions with little government involvement. These deals involve private entities, who are usually offsite beneficiaries of forest services. Buyers may be private companies or urban conservationists who pay forest landowners to improve their forest management practices and, thus, the quality of the services on which the buyer depends.

#### **Examples of Self-Organized Deals**

##### **France:**

After benzene was found in Perrier Vittel's bottled water in 1990, for instance, the company (now owned by Nestle) discovered it would be cheaper to invest in conserving the farmland surrounding their aquifers than to build a filtration plant. Accordingly, they purchased 600 acres of sensitive habitat and signed long-term conservation contracts with local farmers. Farmers in the Rhin-Meuse watershed in northeastern France received compensation to adopt less intensive pasture-based dairy farming, improve animal waste management, and reforest sensitive infiltration zones.

(

[http://ecosystemmarketplace.com/pages/article.news.php?component\\_id=461&component\\_version\\_id=445&language\\_id=12](http://ecosystemmarketplace.com/pages/article.news.php?component_id=461&component_version_id=445&language_id=12))

##### **Chile:**

Private individuals in Chile have invested in Private Protected Areas primarily for conservation purposes and high-biodiversity vacation spots. Payments have been voluntary and driven by a desire to complement government conservation of critical habitat.

3. **Tax Incentives:** Tax incentives are a form of indirect government compensation for landowners protecting ecosystem services. In exchange for committing resources to stewarding ecosystem services, individuals receive tax breaks from the government. Tax incentives are used, for instance, to encourage landowners in the United States to put their land under conservation easements (see Spotlight on Conservation Easements).

4. **Regulation-Driven Open Trading** occurs when a government regulation creates demand for a particular environmental service for instance by setting a 'cap' on the damage to an ecosystem service. The users of the service, or people who are responsible for diminishing that service, respond either by complying directly or by trading with others who are able to meet the regulation at lower cost. Buyers are usually companies, utilities, or other institutions that make direct payments for the ecosystem service.

Sellers are also companies, utilities, and others who are going beyond regulatory requirements. In some limited cases, individuals can sell “offsets” into cap-and-trade schemes.

Voluntary exchanges also exist, as in the case of carbon emission trading in the United States. Companies or organizations seeking to reduce their carbon footprints are motivated to engage in the voluntary market due to brand enhancement, anticipation of emerging regulation, stakeholder and/or shareholder pressure, or other motivations. Voluntary exchanges are also a category of private payments (see Eight is Not Enough for RGGI Scheme; Hitting the Target in New South Wales; Sustainable Fisheries: Can Market Mechanisms Help Get Us There?; Natsource Creates Carbon Credit Pool; Hunter River Salinity Trading Scheme; Profile of a Company and an Industry; Emissions Trading is Not the Mother of Invention).

*In the United States, state regulations have forced agricultural and industrial polluters of waterways either to reduce their discharges directly or to pay other point-source and/or non-point-source polluters to do so and count the reduction credits towards their own registries. Nutrient trading has induced tree-planting in riparian zones to improve water quality. The best known example of open trading is the international carbon trading market, established by the Kyoto Protocol, which allows industrialized countries to trade carbon credits in order to meet their commitments by least cost. Forestry activities which sequester carbon by promoting forest establishment and growth are one mechanism for reducing emissions.*

**5. Voluntary Markets:** Voluntary markets are markets in which buyers and sellers engage in transactions on a voluntary basis (i.e. not because they are forced to trade by regulation or in order to meet a mandatory cap). Generally businesses and/or individual consumers engage in voluntary markets for reasons of philanthropy, corporate social responsibility, public relations, risk management and/or in preparation for participation in a regulatory market (see Voluntary Carbon Market - Climate Wedge ; A Drive to Offset Emissions)

**6. Certification Programs:** When consumers buy certified products, they are paying not just for the product itself, but also for the manner in which it was produced and brought to market. Since such production and transport are often expensive means of production and transport, price premiums associated with certified products can be considerable. When consumers choose to pay the price-premiums associated with products that have been labeled as ecologically friendly, they are choosing, in a sense, to pay for the protection of ecosystem services (though in some cases they may be paying for perceived health benefits). Certification programs designed to reward producers who protect ecosystem services have been developed for a variety of products, including wood, paper, coffee and food, among others (see Pesticide Free but Pricey and Transforming Markets & Supply Chains)

*The Forest Stewardship Council (FSC)--an international nongovernmental organization consisting of representatives from the forest and timber industry, environmental groups, and indigenous peoples' organizations--has established a labeling system for forest management practices. FSC standards establish credible guidelines for timber extraction and forest management.*

*The Rainforest Alliance and the Sustainable Agriculture Network certify coffee, bananas, oranges, and other products grown in and around high-biodiversity-value areas. “Shade-grown” coffee in Mesoamerica, which involves the establishment of coffee trees among other diverse vegetation, has had sales of \$5 billion USD in the United States alone.*

## Glossary

We have also drafted a glossary where you can reference both general and specific terminology. The glossary is broken into six sections with some focus given to each of sectors we cover most.

- \* Specific Terminology
- \* Mitigation Banking & Biodiversity Offsets
- \* Water Quality Trading & Nutrient Trading
- \* Carbon Markets
- \* Conservation Easements
- \* Other Environmental Markets or Payment Schemes

### General Terminology

**Additionality:** Refers to the carbon accounting procedures being established under the Kyoto Protocol, whereby projects must demonstrate real, measurable, and long-term results in reducing or preventing carbon emissions that would not have occurred in the absence of CDM activities. (definition adapted from the CCB Standards)

**Biodiversity** is still an evolving term and, as such, can sometimes be more confusing than it is helpful. The United Nations Earth Summit in 1992 defined biodiversity as "the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems".

Among conservationists, biodiversity is often used as a kind of shorthand to refer to the general importance of intact ecosystems replete with many different species of plants and animals interacting.

**Cap-and-Trade:** A cap-and-trade program is one in which a government or regulatory body first sets a limit or "cap" on the amount of environmental degradation or pollution permitted in a given area and then allows firms or individuals to trade permits or credits in order to meet the cap.

**Compliance Markets & Regulatory Markets:** Compliance markets, also known as regulatory markets, are markets in which buyers and sellers are required to participate in order to comply with regulatory limits on environmental destruction and/or pollution. The European Union Emissions Trading Scheme is, for instance, a compliance carbon market. And, because it is based on clearly defined government regulations, it is also a regulatory market.

**Ecosystem** is a community of organisms and its physical environment.

**Ecosystem Services** are services that the natural environment provides to people. Among others, they include:

- 18 Water filtration
- 19 Crop pollination
- 20 Climate regulation
- 21 Flood control
- 22 Pest control
- 23 Disease control

The Millennium Ecosystem Assessment released in 2005 showed that 60% of ecosystem services are being degraded or used unsustainably.

**Natural Capital** is a concept closely related to that of ecosystem services. Natural capital includes the core and crust of the earth, the full complement of the world's ecosystems, and the upper layers of the atmosphere. Just as economic capital provides steady financial return, natural capital provides steady environmental returns in the form of ecosystem services.

**Offsets & Mitigation** are both used to describe the idea that environmental restoration or pollution reductions in one place can compensate for environmental degradation or pollution elsewhere. The principle in play is that environmental improvements in site A can "offset" or "mitigate" environmental loss in site B.

**Payments for Ecosystem Services (PES)** is an umbrella term often applied to any among a wide variety of schemes in which the beneficiaries, or users, of ecosystem services provide payment to the stewards, or providers, of ecosystem services. While PES is increasingly used as a catch all phrase, the term originated (and is most often used) in the field of sustainable development. In this context, PES frequently acts as a descriptor for schemes that do not rely upon a formal market, but rather rely upon a continual series of payments to rural landowners who agree to steward ecosystem services.

\*use KG definition here\*

**Voluntary Markets** are markets in which buyers and sellers engage in transactions on a voluntary basis (i.e. not because they are forced to trade by regulation). Generally businesses and/or individual consumers engage in voluntary markets for reasons of philanthropy, risk management and/or in preparation for participation in a regulatory market.

**Environmental Derivatives** are financial instruments that derive their value from the value of an underlying security: e.g. futures, options. Some people use the term "environmental derivative" to refer to financial instruments whose underlying value is an environmental benefit or asset of some kind.

## Carbon Markets

**Climate:** The long-term average weather of a region including typical weather patterns, the frequency and intensity of storms, cold spells, and heat waves. Climate is not the same as weather.

**Global Warming:** The progressive gradual rise of the Earth's average surface temperature thought to be caused in part by increased concentrations of GHGs in the atmosphere. (Since emission of GHGs into the atmosphere could, paradoxically, lead to cooling of some parts of the world, most people now prefer to use the term "climate change" as opposed to "global warming")

**Greenhouse Effect:** The greenhouse effect is the insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 60°F warmer than it would be otherwise.

**Greenhouse Gas (GHG):** Any gas that contributes to the "greenhouse effect."

**Carbon Dioxide (CO<sub>2</sub>):** CO<sub>2</sub> is a colorless, odorless, non-poisonous gas that is a normal part of the ambient air. Of the six greenhouse gases normally targeted, CO<sub>2</sub> contributes the most to human-induced global warming. Human activities such as fossil fuel combustion and deforestation have increased atmospheric concentrations of CO<sub>2</sub> by approximately 30 percent since the industrial revolution. CO<sub>2</sub> is the standard used to determine the "global warming potentials" (GWPs) of other gases. CO<sub>2</sub> has been assigned a 100-year GWP of 1 (i.e., the warming effects over a 100-year time frame relative to other gases).

**Carbon Dioxide Equivalent (CO<sub>2</sub>e):** The universal unit of measurement used to indicate the global warming potential (GWP) of each of the 6 greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.

**Global Warming Potential:** The GWP is an index that compares the relative potential of the 6 greenhouse gases to contribute to global warming (i.e. the additional heat/energy which is retained in the Earth's ecosystem through the release of this gas into the atmosphere). The additional heat/energy

impact of all other greenhouse gases are compared with the impacts of carbon dioxide (CO<sub>2</sub>) and referred to in terms of a CO<sub>2</sub> equivalent (CO<sub>2</sub>eq) i.e. Carbon dioxide has been designated a GWP of 1, Methane has a GWP of 23. The latest officially released GWP figures are available from the IPCC in their publication Climate Change 2001: The Scientific Basis.

**Greenhouse Gas Offsets & Carbon Credits:** Greenhouse gas offsets, also known as carbon credits, are marketable certificates representing reductions in greenhouse gas emissions. Offsets generated by emission reductions in one place, the theory goes, may be used to cancel out excess greenhouse gas emissions anywhere in the world. GHG offsets and carbon credits are generally sold as tons of carbon dioxide (CO<sub>2</sub>) or carbon dioxide equivalent (CO<sub>2</sub>e), with each credit representing a pollution reduction of one ton worth of CO<sub>2</sub>.

**Compliance/Regulatory Carbon Market:** Compliance carbon markets and regulatory carbon markets are one in the same. The term refers to markets that are driven by regulatory caps on the amount of atmospheric pollution an entity or individual can emit without incurring fines.

**Voluntary Carbon Market:** Most published data on the carbon market reflects compliance requirements that have essentially commoditized carbon as a tradable good with a fairly standardized price and quality. In parallel with this compliance market, voluntary activity by businesses and individuals wanting to reduce GHG emissions for reasons other than statutory compliance grew substantially in 2005. This side of the market essentially represents consumer demand for action on global warming and has the potential to be an active driver of change as the international community struggles to fully implement an effective climate change framework. While maturing quickly, the voluntary market remains small, fragmented and multi-layered.

**Verified Emissions Reductions (VERs):** Verified Emissions Reductions (VERs) are reductions in emissions of greenhouse gases that have been officially verified by a third party verifier; usually verifiers approved by CDM Executive Board. VERs are often seen as the currency of the voluntary carbon market, as opposed to CERs (Certified Emissions Reductions), which are the currency of the Kyoto Protocol's Clean Development Mechanism and EUAs (European Union Allowances), which are the currency of the EU ETS.

**Carbon Sinks:** The term carbon sink refers to any process that removes more carbon dioxide from the atmosphere than it releases. Both the terrestrial biosphere and oceans can act as carbon sinks.

**Carbon Sequestration:** Carbon sequestration is the process of removing atmospheric CO<sub>2</sub>, either through biological processes (e.g. plants and trees), or geological processes through storage of CO<sub>2</sub> in underground reservoirs.

**Conservation of Carbon:** In projects seeking carbon credits for avoided deforestation, carbon that is sequestered in biomass is conserved by activities impeding its loss and emission in to the atmosphere.

**Land Use, Land-Use Change and Forestry (LULUCF):** Land uses and land-use changes can act either as sinks or as emission sources. It is estimated that approximately one-fifth of global emissions result from LULUCF activities. The Kyoto Protocol allows Parties to receive emissions credit for certain LULUCF activities that reduce net emissions. The European Union Emissions Trading Scheme, on the other hand, does not currently allow the trading of credits generated by LULUCF activities.

**Afforestation:** Afforestation is an example of a type of LULUCF activity and refers, specifically, to the planting of new forests on lands that have not been recently forested.

**Kyoto Protocol to the UN Framework Convention on Climate Change:** An international agreement adopted in December 1997 in Kyoto, Japan. The Protocol sets binding emission targets for developed countries that would reduce their emissions on average 5.2 percent below 1990 levels.

**Annex I Parties:** The 41 countries plus the European Economic Community listed in Annex I of the UNFCCC that agreed to try to limit their GHG emissions: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, European Economic Community, Estonia, Finland, France,

Germany, Greece, Hungary, Iceland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, The Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States.

**Kyoto Mechanisms:** The Kyoto Protocol creates three market-based mechanisms that have the potential to help countries reduce the cost of meeting their emissions reduction targets. These mechanisms are Joint Implementation (Article 6), the Clean Development Mechanisms (Article 12), and Emissions Trading (Article 17).

**Emissions Trading:** Emissions trading is a market mechanism that allows emitters (countries, companies or facilities) to buy emissions from or, sell emissions to, other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions (e.g. reductions in excess of those required under some regulation) to those for whom achieving reductions is more costly.

**Clean Development Mechanism (CDM):** The Kyoto Protocol requires that industrialized countries reduce their carbon emissions to five percent below 1990 levels, either by cutting/trading emissions domestically or via two so-called "mechanisms for flexibility." The option known as the Clean Development Mechanism (CDM) allows companies in industrialized countries to fund greenhouse gas reduction projects in the developing world in exchange for carbon credits. The CDM is the Kyoto Protocol's primary means of involving developing countries in its attempts to reduce greenhouse gas emissions.

**Certified Emissions Reductions (CERs):** Reductions of greenhouse gases achieved by a Clean Development Mechanism (CDM) project. An emissions reduction becomes "certified" when it is approved for sale by the Clean Development Mechanism's Executive Board. A CER can be sold or counted toward Annex I countries' emissions commitments. Reductions must be additional to any that would otherwise occur.

**Joint Implementation (JI):** The Kyoto Protocol requires that industrialized countries reduce their carbon emissions to five percent below 1990 levels, either by cutting/trading emissions domestically or via two variety of so-called "mechanisms for flexibility." The option known as the Joint Implementation (JI) program allows industrialized countries to meet part of their required cuts in greenhouse-gas emissions by paying for projects that reduce emissions in other industrialized countries. In practice, this will likely mean facilities built in the countries of Eastern Europe and the former Soviet Union -- the "transition economies" -- paid for by Western European and North American countries.

**European Union Emissions Trading Scheme (EU ETS):** The European Union Emissions Trading Scheme (EU ETS or, simply, ETS) is the world's largest mandatory carbon dioxide (CO<sub>2</sub>) emissions trading scheme. It is also the world's first such scheme that operates at the multi-national level. Since 1 January 2005, the ETS has imposed CO<sub>2</sub> emissions targets on roughly 4,500 industrial companies across the 25 countries of the European Union.

**European Union Allowances (EUAs):** European Union Allowances (EUAs) are the currency of the EU Emissions Trading Scheme (ETS), the world's first mandatory carbon dioxide (CO<sub>2</sub>) emissions trading scheme.

## Conservation Easements

**Conservation Easements:** Conservation easements are legal contracts that restrict the use and development of a piece of land, usually in perpetuity. They have been used for a variety of purposes: to conserve valuable ecosystems, as well as to preserve farms and a rural way of life.

During the past two decades, the growth in the use of easements across the US has expanded rapidly. Land trust holdings, which use easements to accomplish their goals, have mushroomed in large part

because of tax incentives encouraging landowners to donate conservation easements on their land. Congress made easement donations tax-deductible in 1976, and state revenue collectors have continued to sweeten the pot ever since.

**Transferable Development Rights (TDRs):** Under a TDR program, development rights are transferred from "sending zones" which are designated for protection to "receiving zones" which are designated for future growth. Conservation easements provide permanent protection from development in the sending zone.

## Other Environmental Markets or Payment Schemes

**Individual Transferable Quotas & Individual Fishing Quotas:** In the last three decades, several countries have turned to transferable quotas to manage their commercial fisheries. This system sets a maximum total allowable commercial catch, then gives fractions of the right to catch fish to members of the fishing industry. The quotas can then, depending on the individual quota management system, be bought, sold, traded, and leased on the open market. The quotas themselves -- commonly known as individual transferable quotas (ITQs), or individual fishing quotas (IFQs) -- are a form of property right, giving each fisherman the right to catch a designated portion of the total catch in perpetuity. In structure, then, fisheries quota markets resemble sulfur dioxide and other cap-and-trade systems -- with the ocean's greater uncertainty thrown into the mix.

**Forest Stewardship Council (FSC):** The Forest Stewardship Council (FSC) is an international network to promote responsible management of the world's forests. Frequently, wood and paper products will be marketed as FSC certified which indicates that they have been produced and sourced in a manner that meets environmental and social standards set by the FSC.

**Renewable Energy:** Renewable, or green, energy sources produce energy without many of the associated ills -- pollution, waste and risk -- that plague more traditional sources of energy. Consequently, millions of industrial and residential consumers are now showing they are willing to pay more for green power sources such as wind, solar and biomass resources.

**Renewable Energy Credits (RECs) & Green Tags:** RECs -- also known as tradable renewable certificates, or green tags -- represent the environmental attributes of a unit of electricity generated from renewable fuels.

In a typical REC scheme, the government determines a renewable energy target and then allocates responsibility for meeting it to the energy suppliers under its jurisdiction. Utilities then can meet their respective targets by either generating green energy themselves, or by buying RECs from elsewhere. This system allows RECs - essentially the "greenness" of the renewable energy" - to be sold separately from the electricity itself. Thus, RECs are flexible and can easily be traded on regional scales, encouraging the most efficient development of renewable energy sources.

## Mitigation Banking and Biodiversity Offsets

**Wetland Mitigation Banking:** The US Clean Water Act mandates that whenever a developer wants to build on or near a wetland, they must obtain a permit from the US Army Corps of Engineers. Before issuing the permit, the Corps is supposed to weigh whether the damage is truly necessary. If the damage is indeed necessary, the Corps is supposed to require that the developer minimize any potential harm to the wetland. Finally, where damage is unavoidable, the developer is required to compensate (or mitigate) for this damage by restoring a former wetland, enhancing a degraded wetland, creating a new wetland, or, in some very rare cases, preserving an existing wetland.

The law states that developers can fulfill this "compensatory mitigation" themselves (usually at or near the development site), or they can pay third parties to mitigate for damage in their stead. If they decide to pay someone else to do the work for them, they have several options: (1) They can buy "wetland credits" from a mitigation bank, usually a for-profit entity that "creates, enhances, or restores" a wetland and then is

allowed by the Corps to sell wetlands credits -measured in acres- to needy developers; (2) They can pay "in-lieu-fees" to public entities or private not-for-profit organizations that, in agreement with the Corps, use the money to "protect, enhance, or restore" wetlands.; or (3) They can pay a third party that is neither a mitigation bank nor an in-lieu fee provider to undertake the mitigation. These are referred to as "ad-hoc" arrangements.

As a result of these requirements for wetlands mitigation, a burgeoning market for wetlands mitigation has developed in the US. A report by the Environmental Law Institute estimates that between 1992 and 2002 there has been a 376 percent increase in the number of private wetlands banks in the US. They estimate that in 2002 there were 219 approved banks, with some 95 more pending approval. No one knows for sure, but the market for environmental mitigation in the US is estimated to be worth hundreds of millions of dollars.

**Stream Mitigation Banking:** Stream mitigation banking began in 1996 when the US Army Corps of Engineers (USACE) started specifically regulating impacts to streams in its nationwide permits. Stream mitigation banking works much like wetland mitigation banking (see above) except that the banks and credits are associated with stream restoration projects rather than wetland restoration projects. And instead of acres of wetlands created, enhanced, or restored, mitigation is measured in "linear feet" of stream banks "created, enhanced, or restored".

**Conservation Banking:** the application of the "mitigation" or "offset" approach to endangered species. When developers expect to harm an endangered species (whether listed at the federal or state level), they are forced to "offset" or "mitigate" the damage through the creation of habitat for a similar number of plants and animals somewhere else. Traditionally, developers mitigated for the damages by purchasing new property or modifying existing landholdings to support the impacted species. The investment required to site these areas was significant and land management responsibilities were onerous. Many developers are now finding that they would rather buy "mitigation credits" from a so-called "conservation bank" that has already achieved the mitigation and has obtained approval from the Fish and Wildlife Service to sell these "mitigation credits."

Conservation banking officially began in California in 1995 when the state released an Official Policy on Conservation Banks and approved the Carlsbad Highlands Bank in San Diego County. Established by Bank of America, the conservation bank provided coastal sage scrub habitat for the California gnatcatcher. California's Department of Transportation was the bank's first customer, buying eighty-three acres to mitigate a highway project.

**Biodiversity Offsets:** Through activities that are beneficial to the conservation of biodiversity, biodiversity offsets are intended to compensate for the residual, unavoidable harm to biodiversity caused by a development project. In the case of mining, offsets can take a variety of forms: the creation of new protected areas; the launch of conservation projects outside of the project area; projects building the capacity for conservation. At their most basic level, any activity that will be considered sufficient compensation for the damage caused by a mine or other development project may be dubbed a biodiversity offset.

For ecosystem marketplace articles on mitigation banking and biodiversity offsets, see: [Banking on Conservation: Species and Wetland Banking in the US \[pdf\]](#).

## Water Quality Trading & Nutrient Trading

**Hypoxia:** Dropping oxygen levels in deep waters characterize an environmental event known as hypoxia. Hypoxia can occur naturally, but is more frequently caused by the human-driven contamination of surface waters. There are now at least 150 man-made hypoxic dead zones in global waters. North America, South America, Europe and Asia all suffer from dead zones of varying severity, and some dead zones affect an underwater territory the size of a small country...or two.

**Total Maximum Daily Load (TMDL):** Water-quality trading is akin to emissions trading, in that it sets limits (caps) on the amounts of pollution that enters a waterway, and then lets emitters trade to meet these limits. The TMDL for a watershed is the limit or cap on the amount of pollution allowed in the watershed. Theoretically, TMDLs represent the maximum amount of pollution that a watershed can endure without suffering any ecosystem degradation.

**Point Sources & Non-Point Sources:** Most watersheds contain two types of polluters - point sources and non-point sources. Point sources are industrial enterprises that emit nutrients (i.e. pollutants) directly into a watershed from a single pipe or point. Non-point sources, on the other hand, are agricultural or municipal polluters whose pollution washes into a watershed over a diffuse area. For a variety of political, social, economic, and logistic reasons, point sources usually are regulated, while non-point sources are not.

**Nutrient Trading:** Studies in the United States have found that non-point sources in particular agricultural polluters account for more than 80% of the country's nitrogen and phosphorous discharges. Clearly, if eutrophication (caused by an excess of nitrogen, phosphorous and/or silica) is to be avoided in many watersheds, non-point sources must be incorporated into schemes for curbing nutrient discharges. The idea of nutrient trading has risen to ascendancy during the last decade because it offers a cost-effective way of doing just this.

After years of regulation, many factory owners have already invested enough in pollution abatement, that further efforts to reduce their discharges (i.e. an upgrade to the next-better technology) would be prohibitively expensive. Farmers, by contrast, often can reduce their pollution levels relatively cheaply by changing tilling, planting and/or fertilization practices. Studies suggest that, in some instances, point source reductions can be up to 65 times as expensive as non-point source reductions.

Nutrient trading schemes capitalize on this cost discrepancy by setting discharge limits for point sources without stipulating how the limits must be met. The result is that industrial polluters often opt to pay farmers to reduce their pollution emissions along a river rather than invest in expensive technology to further limit their own discharges. This system allows industrial factories to operate within the watershed's overall discharge caps at a lower cost than they otherwise might. In effect, the factories are purchasing pollution permits from farmers at a market price that is amenable to both parties. Such 'cap-and-trade' systems, many argue, allow communities to meet pollution standards in the most cost-effective way possible. Trades between point sources also are feasible, but the significant cost savings associated with nutrient trading derive, at least in theory, from the non-point/point trades just described.

For Ecosystem Marketplace coverage of nutrient trading see: [Nutrient Trading and Dead Zones: Can They Wake Each Other Up?](#); [Hunter River Salinity Trading Scheme](#).

## Introduction to the Ecosystem Marketplace website

The Ecosystem Marketplace (EM) ([www.ecosystemmarketplace.com](http://www.ecosystemmarketplace.com)) was born to provide you with the information services needed to build a revolutionary new economy that will pay for, and invest in, ecosystem services. In particular, EM covers payment programs for three kinds of ecosystem services:

- Climate stabilization (carbon sequestration in trees, plants and marine ecosystems)
- Water-related ecosystem services (water quality, groundwater recharge, flood control)
- Biological diversity benefits (scenic beauty, ecosystem resilience, pollination, pest control, disease control, etc).

The EM has tagged the different areas of our MarketWatch coverage simply as: carbon; water and biodiversity.

The MarketWatch section is on our homepage at [www.ecosystemmarketplace.com](http://www.ecosystemmarketplace.com) and you can use it to track transactions across 14 different markets around the globe. If you want to find out what buyers are paying for ecosystem services in different corners of the world, click on the MarketWatch section and then pick your market.

In addition to MarketWatch information, EM provides several other types of services that might be of interest to you. On our homepage we run new features focusing on important issues in the world of environmental markets and we update news gathered from media sources around the world that touch on some aspect of payments for ecosystem services. Check the list of articles on the right hand side of the screen for a daily update.

After our features run on the homepage, they are all permanently archived on the site, where you can find them by entering a keyword in the search bar at the upper right of the homepage. If you click on the news tab, you will see all the news articles we have run during the past two months.

Beyond MarketWatch and news services, EM has a directory that you can use to find organizations working on setting up payments for ecosystem services in your area and an event section where you can keep your eye out for conferences and meetings you may want to attend.

Last but not least, EM has a big library of scholarly articles, case studies and toolkits that you can access by clicking on the library tab on the homepage. You might use this area to find out how to measure soil carbon or to research other projects that may be similar to your own.

However you choose to use EM, we hope it will be of use to you and we welcome your feedback: [info@ecosystemmarketplace.com](mailto:info@ecosystemmarketplace.com)