

# Integrated Solutions:

Water, Biodiversity, and the Clean Development Mechanism





This publication is made possible by the generous support of the American people through the United States Agency for International Development (USAID), under the terms of the TransLinks Cooperative Agreement No.EPP-A-00-06-00014-00 to The Wildlife Conservation Society (WCS). TransLinks is a partnership of WCS, The Earth Institute, Enterprise Works/VITA, Forest Trends and The Land Tenure Center. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.



# Integrated Solutions:

Water, Biodiversity, and the  
Clean Development Mechanism

# Introduction

*It is widely acknowledged that well-functioning ecosystems provide reliable and clean flows of water, productive soils, healthy and balanced biota and many other services for human well-being. It is also widely documented that today many ecosystems and the services they provide are under threat. The Millennium Ecosystem Assessment, the most comprehensive study of ecosystem services to date, concluded that more than 60% of the world's ecosystems are being used in ways that are not sustainable. Many conservation experts argue that for ecosystem services to be maintained at a healthy level, stewardship needs to become more profitable than alternative land uses.*

The use of markets and market-based mechanisms to conserve and pay for ecosystem services is a growing global trend that is gaining a solid foothold not just in the carbon markets, but also biodiversity and water markets. Furthermore, these payments for ecosystem services (PES) are a practice that is no longer solely important to environmentalists but has become of essential interest to small local communities, government regulators, businesses, and financiers all over the world.

PES schemes encompass innovative private deals, financing schemes, and government programs that have been structured around the premise that natural ecosystems provide valuable services, and that if marketed correctly, these services might help watershed and biodiversity conservation pay for itself and generate income for those willing to participate.

West Africa has come late to the PES table, but it's hard to think of a more appropriate guest: the resource-rich Continent stands before a development boom that threatens to destroy the very resources that will fuel its growth for the next century, and PES schemes can help to preserve this natural legacy by recognizing the economic value of nature's services.

Schemes that promote sustainable water use are just now beginning to take hold, and scores of pilot projects designed to preserve biodiversity are also in the works.

Massive hydroelectric development projects along the Congo and other rivers promise to deliver clean energy to growing cities — but at the cost of habitat important to thousands of species. In the future, we can expect to see the implementation of biodiversity offsets that enable the development of clean energy projects that also have a net positive impact on habitat for endemic species.

Over the past five years, several such projects have been proposed, and a growing number of people have begun to call for mitigation of damage to marine habitat that results from large-scale hydroelectric projects. A few of these projects even made it to the pilot phase — but a lack of will and financing has left them languishing before conclusions should be drawn. We can expect this to change as the region's prosperity grows and its priorities shift to the long-term preservation of habitat — for food species as well as for endangered animals in general.

## Introduction

---

An active debate is also emerging on the role of PES in ensuring that oil exploration leaves behind a sustainable energy mix and healthy environment.

Here, the debate is about whether PES schemes are, in fact, the best way to avoid the “Dutch Disease” — a term coined by the Economist in 1977 to describe the devastation that the Netherlands’ manufacturing sector suffered after the discovery of oil in the North Sea.

Several PES proponents have argued that oil companies should build wind farms and make other direct payments to environmentally-friendly projects to offset damage to the environment, but others believe a better solution is the “Norwegian Cure” — namely, negotiating high exploration rates and then channeling the revenues into a long-term development fund.

This, again, is a story that you can expect to see covered in more detail in the pages of Ecosystem Marketplace and elsewhere.

This booklet is meant to provide context and background information on current developments in the PES arena relevant to the Ghana Katoomba conference, held in Accra, Ghana, on October 6-7, 2009. The conference is the fifteenth in a series of Katoomba conferences designed to stimulate and strengthen environmental markets around the world.

The bulk of the content in this booklet originally appeared in Ecosystem Marketplace, a project of Forest Trends and the leading source of news and information on payments for ecosystem services.

Launched in Katoomba, Australia in 1999, the Katoomba Group is an international working group composed of leading thinkers and practitioners from academia, industry and government, all committed to enhancing the integrity of ecosystems through market solutions that are efficient, effective, and equitable. The group is a sister project of Ecosystem marketplace and is also sponsored by Forest Trends

# Table of Contents

## I The Big Picture

- 1     **The Matrix: Mapping Ecosystem Service Markets**  
By Nathaniel Carroll and Michael Jenkins
- 5     **Biodiversity Banking: A Primer**  
By Ricardo Bayon
- 18    **Water Trading: The Basics**  
By The Ecosystem Marketplace Team

## II Global Developments

- 23    **Between Purity and Reality: Taking Stock of PES Schemes in the Andes**  
By Sven Wunder
- 25    **More Corporations Seek Solutions to Global Water Crisis**  
By Tracy Stanton
- 27    **How the US is Forging a National Ecosystem Marketplace**  
By Alice Kenny

## III Local Developments

- 31    **Payments for Ecosystem Services in Gabon's Mbé Watershed**  
By Emilie Filou
- 36    **CDM in Africa: Facing the Hurdle of Conventional Finance**  
By Durando Ndongsok

# The Big Picture

## The Matrix: Mapping Ecosystem Service Markets

by Nathaniel Carrol and Michael Jenkins

*The once-radical concept of saving the environment by documenting the economic value of environmental services and then getting industry to pay is finally catching on — but how is one to keep track of all the new methodologies and concepts? The Ecosystem Marketplace offers one solution: The Matrix, a new tool for surveying the ecosystem services landscape.*

To download the Matrix, visit <http://www.ecosystemmarketplace.com>

**17 June 2008** | Over the past decade, more and more businesses have come to recognize that man's economy depends on the earth's ecology, and that ecosystem services — from waste treatment and pollination to genetic resources — generate tangible benefits to industry.

Furthermore, because these benefits have gone unquantified, they have also gone unpaid for — and the ecosystems that provide them are in decline.

This has sparked a diverse array of efforts around the globe to value and pay for ecosystem services.

Many of these Payments for Ecosystem Services (PES) efforts — like the booming carbon markets — already channel billions of dollars into projects designed to keep the planet's ecosystem infrastructure alive.

Others, however, are less developed.

Even in carbon — by far the most successful ecosystem market to date — the concepts are emerging, changing rapidly, and dispersed across geography and institutions.

All of which makes it difficult to get a clear sense of the big picture of these markets: What are the major markets for ecosystem services? How big are they? Who's involved? Where are they heading?

### Mapping the Markets

To map this PES landscape, the Ecosystem Marketplace researched the main PES schemes and each of their sub-categories (mandatory or “compliance” offsets for carbon forestry, voluntary offsets for carbon

## The Big Picture

---

forestry, government-mediated watershed protection, and mandatory or “compliance” offsets for biodiversity, among others) and their key characteristics (size, environmental impact, community impact, market participants and shapers, and emerging trends).

To collect the information on such a broad spectrum of topics, we pulled together a team of authorities on PES, each of whom performed interviews, literature searches, and web searches to collect information for a specific category of market.

The result of this effort is a large spreadsheet showing all of the markets and their defining characteristics side by side. This poster-sized chart is a powerful tool for viewing and thinking about PES markets. We’ve dubbed it “the Matrix”.

To create a more reader-friendly format for accessing this information online, we’ve split the Matrix into ‘market profiles’ that are essentially executive summaries or narratives for each market.

## Commodity Types

There are different ways of categorizing markets for ecosystem services. If you’re viewing them as ecological commodities, they follow the popular grouping of: *carbon, water, biodiversity, and bundled services*.

**Carbon markets** generally reward the stewardship of an ecosystem’s atmospheric regulation services — specifically, the absorption of carbon dioxide from the atmosphere.

**Water markets** provide payments for nature’s hydrological services — primarily the filtering of water through wetlands.

**Biodiversity markets** create an incentive to pay for the management and preservation biological processes as well as habitat and species.

**Bundled payments** secure all or a combination of carbon, water, and biodiversity services. Bundled payments also include those in which the ecosystem service payment is built into the price of the product, such as certified timber or certified produce.

## Payment Types

If, on the other hand, you are viewing them as payment types, they fall into three categories: *voluntary, compliance, or government-mediated*.

**Compliance markets** are driven by regulation and enforcement, similar to other pollutant trading markets.

**Voluntary markets** are driven by ethical and/or business-case motives. In many cases, the threat of future regulation also drives these markets.

And **government-mediated markets** are publicly-administered programs that use public funds to pay private landowners for the stewardship of ecosystem services on their property.



## Lay of the Land

The Matrix shows that while most PES markets are growing at approximately 10 to 20 percent a year, the carbon markets are skyrocketing at 200 to 700 percent a year.

While this is no surprise to most followers of environmental markets, carbon's surge is a dramatic entrance for an environmental commodity onto the world markets, and perhaps indicative of the power of markets for ecosystem services.

## Promises and Pitfalls

The participants and experts we surveyed said they believe existing markets have the potential to serve the environment — but may not be living up to their potential. This underscores that these payment systems are instruments that by themselves aren't a solution.

PES, in other words, is not a single tool, but an entire tool box with different instruments for different circumstances.

To achieve the sustainable management of ecosystem services, PES schemes must be designed and implemented carefully, intelligently, and adaptively.

## Spreading (and Tailoring) the Wealth

A recurring theme is the potential benefit for PES schemes in developing countries, as well as the necessity to tailor them to the specific circumstances of the region.

Many of the national compliance markets in developed countries require sophisticated regulation and enforcement to drive effective markets, such as species mitigation credits and water quality trading.

Developing countries, however, host a good number of PES schemes that are structured differently. The largest of these are the government-mediated programs in South Africa, Brazil, and China. China's watershed protection program alone is estimated to generate \$4 billion a year in payments.

## Social Equity

Perhaps the most important example of how these markets must be crafted and managed carefully is the issue of social equity.

The majority of ecosystem services are produced in rural and natural areas where local communities depend closely on ecosystem goods and services and are the environmental stewards. It is clear from our research that an important aspect across all of these markets will be to ensure that the communities and small scale producers are able to actively participate and benefit from ecosystem service markets.

This will mean developing instruments to provide support, such as aggregation services to communities, shaping regulation to engage local small-scale providers, and clarifying tenure and user rights associated with these new opportunities.

There may be a large wave of investment opportunity in rural areas that are providers of these services. To make sure it is distributed fairly, organizations and overseas development aid groups that care about the equity dimension will have to provide a focused effort.

This is an important section of the Matrix and is reflected in the work of Forest Trends and the Ecosystem Marketplace.

### Staying Oriented

A quick glance over the Matrix and through the pages of the market profiles will show that, indeed, there are a good number of initiatives attempting to value and pay for the services our green infrastructure provides. And with a closer look, informative patterns emerge in how PES are being applied in different circumstances.

We developed the Matrix to help members of the Katoomba Group and others working in this field to visualize and track the shifting global trends and nuances in PES — basically, to get oriented in the PES landscape.

### Building a Database

To further this aim, we are developing an online database of the Matrix. This will provide convenient and current access to basic PES information provided in the Matrix. It will also allow for collaboration and data contribution, enabling the PES Matrix to be a living document under broad and continual update.

The Matrix products — chart, narrative, and online database — will aid in the evaluation and comparison of the different shapes and sizes of PES systems around the globe, creating a better understanding of what is being done, as well as where, by whom, and with what effect. We hope this will help refine existing PES systems and spur new and creative solutions.

*Nathaniel Carroll is Project Director of the Ecosystem Marketplace. He can be reached at [ncarroll@ecosystemmarketplace.com](mailto:ncarroll@ecosystemmarketplace.com).*

*Michael Jenkins is Publisher of the Ecosystem Marketplace and founding President of Forest Trends.*

# Biodiversity Banking: A Primer

By Ricardo Bayon

*Mitigation Banking makes it possible for real estate developers to turn biodiversity into an asset instead of a liability — which ultimately makes it possible to preserve that biodiversity across the United States. But how do such mechanisms work? And what challenges do they face? The Worldwatch Institute tackled these issues in Chapter 9 of the 2008 State of the World: Innovations for a Sustainable Economy. For the sake of brevity, footnotes and sidebars have been eliminated. The entire chapter in its entirety can be viewed at [www.worldwatch.org](http://www.worldwatch.org). Reprinted by permission.*

**19 February 2008** | Assuming agreement of the need to protect Earth's biological wealth, how much would you be prepared to pay to protect an endangered fly? Would you spend \$1.50, \$15, \$150,000, or more?

How about society as a whole: How much should society spend on the protection of this fly? Does the answer depend on the nature of the fly itself? On its role in the ecosystem?

Or is the calculus based on something else — perhaps on what you must give up to save the fly, or your standard of living, or your priorities?

The questions may seem crass and materialistic — and in some ways they are — but they are essential if the world is to conserve the species and ecosystems that sustain humankind.

The reason is simple: like many other important matters, the staggering loss of biodiversity is really a matter of values — and not just the principles that allow people to distinguish right from wrong, but also the more mundane concept of economic values.

## Externalities: the Economic Blind Spot

In a way, the issue boils down to the fact that the world is losing species and ecosystems because the economic system has a blind spot. It sends the signal that cutting down a rainforest to grow soybeans or palm oil plantations makes more economic sense than leaving that forest intact. It says that building a shopping mall to sell iPods is more valuable than having a wetland that buffers coasts against storms, filters water, and provides nesting ground for birds.

It is what economists call a problem of externalities. Some values — like that of a species of woodpecker or of a particular ecosystem such as a rainforest or a wetland — do not enter into the economic system. They are external to it, and so they are not taken into account when economic decisions are made. Indeed, for eons the price of nature has been woefully close to zero. Supply outstripped demand, and priceless came to mean worthless.

But that equation is changing. Priceless nature is becoming increasingly scarce, and therefore needs to be made valuable once again. Giving some economic value to biodiversity would make it easier to protect. At the very least, standing rainforests would not compare so unfavorably when considered against soybean fields and palm oil plantations. Their value would no longer be zero.

### Nature on the Block

It may sound strange, even counterintuitive, but the solution to the loss of biodiversity may actually lie in the very same markets that appear to be causing the problem. It may lie in creating payment schemes for biodiversity; mechanisms that give nature a value and that force the economy to look into its blind spots.

Luckily, a good number of countries — from Australia and Brazil to the United States — have been experimenting with such schemes, sometimes for more than 20 years, and there is much to be learned.

Countries use a variety of mechanisms for giving value to ecosystems and the services they provide. In essence, these can be summarized as follows:

- **Government sets the price:** This is done either by fining those who damage the ecosystems (through endangered species laws, for instance) or by paying those who conserve it (providing tax breaks or subsidies for conservation, for example). While these systems are useful and play an important role in protecting biodiversity, they suffer from a fundamental flaw: they do not send the right signals to the economy; they do not permit society, via markets, to determine and understand the actual value (the price) of biodiversity.
- **Voluntary transactions set the price:** Users of ecosystem services voluntarily agree on the value with those who provide the services. These “self-organized private deals” are sometimes mislabeled as “markets,” but true markets depend on multiple buyers and multiple sellers meeting regularly to exchange goods and services. In contrast, in most cases these are one-time-only deals. They may also take the form of “voluntary biodiversity offsets,” in which an individual or company that damages biodiversity pays to “protect, enhance, or restore” an equivalent amount of biodiversity somewhere else.
- **A hybrid system sets the price:** In this case, scarcity of a traditionally “public” good is established through government regulation, which then forces buyers and sellers to negotiate in order to set a price for the good or service in question. Examples of this include various “cap-and-trade” schemes in the United States for sulfur dioxide and in Europe for greenhouse gases. These schemes create true markets because they generate demand for services from multiple buyers and therefore lead to the provision of services from multiple sellers.

While government payment schemes and voluntary biodiversity offsets are extremely useful and are likely to account for the majority of global payment schemes for biodiversity in the near future, they tell more about where we are now than where we might be in the future. The new and emerging regulated markets for biodiversity offsets hold the key to that future.

Therefore, we are focused here mainly on the third of these mechanisms: regulatory cap-and-trade systems.

Before delving too deeply into these issues, however, a story:

There is a small town nestled in the sand dunes east of Los Angeles — Colton, California — that provides some idea of the new world that may be emerging as a result of regulated markets for biodiversity off-sets.

Colton is smack in the economic center of San Bernadino County, one of the fastest-growing counties in the United States. But there is a fly in Colton's ointment of future economic growth.

## A Fly in the Ointment

The city is currently involved in a series of legal battles over how much it should be prepared to pay to save an endangered fly: the Delhi Sands Flower-loving Fly, a rather pretty insect that, like a butterfly, hovers and sips nectar from local flowers. This tiny creature has the distinction of being the first fly — and only the seventeenth insect — to be declared an endangered species in the United States.

According to the U.S. Endangered Species Act (ESA), no individual or entity, public or private, can harm an endangered species — not even a fly — without a permit from the government. Thus, shortly after this fly was listed as an endangered species, construction of a hospital in San Bernadino county ground to a halt.

The hospital had planned to pave over seven acres of occupied fly habitat, but that all of sudden became illegal. The hospital then had to spend \$4 million redrawing its plans, moving its parking lot 250 feet, and making a few other minor changes. All so it wouldn't harm a fly.

## The \$150,000 Fly

How much is a fly worth? Do you judge by what the fly does? With this fly, scientists do not know the answer to that question.

They know that pollinators, such as this fly, tend to have important and symbiotic relationships with the plants they feed on. In some cases, without the pollinator the plant cannot reproduce. Perhaps the flower-loving fly plays that role. Or it could be a cornerstone species, without which an entire ecosystem could collapse. Or maybe protecting this fly will protect dozens of other species, some of which may not even have been discovered yet.

Or maybe not.

E. O. Wilson has written: "I will argue that every scrap of biological diversity is priceless, to be learned and cherished, and never to be surrendered without a struggle."

The state of California, in contrast, has a more moderated view. Having determined that the fly should be protected, it decided to let the market decide what it costs to conserve it. And the market determined that the going rate in California for Delhi-sands fly habitat is currently somewhere between \$100,000 and \$150,000 an acre.

## The Big Picture

---

This story is interesting not so much because it is hard to believe that people are buying fly habitat — let alone paying \$150,000 for it — but rather because it forces society to answer that crass and materialistic question: How much is nature really worth?

Some would argue that the question should not even be asked. And yet society answers this question “by default” every day. Every time people buy soybeans, for example, they are putting a value on the Amazonian rainforests that were cleared to grow them.

At least in the case of the fly, the price tag is clear, evident, and visible. If a developer wants to pave over fly habitat, it will cost the company (in today’s market) as much as \$150,000 an acre. If that were all there was to this story, the concept of putting a price on endangered species would be quite troubling. It implies that someone could pay the price set by the marketplace and then go ahead and destroy the last surviving population of a species.

### Bug Offsets

But that is not what is happening. The \$150,000 paid to pave over the fly’s habitat is actually being used to protect or create habitat for that same fly somewhere else. It is, in other words, an “offset” — not unlike the carbon offsets people are buying to counteract their greenhouse gas emissions.

As the money goes into legally and financially protecting the flies forever (at least in theory), in a way it is a market, or at least a market-like mechanism. It puts a value on endangered species and habitat, turning them into marketable assets. It puts a cost on the fly for those who would harm it, and at the same time it creates a value for those who would conserve it.

It is this marvelous alchemy — turning cost into value, liability into asset — that may ultimately allow society to preserve biodiversity. But does it work? And, if so, how does it work?

### Wetland Mitigation Banking

Since the mid-1980s, the United States has had a series of functioning biodiversity markets worth more than \$3 billion a year. This system is currently the largest and most well-established experiment on Earth on creating biodiversity markets. Although these are markets involving the private sector, it is government that makes these markets possible.

The system that makes the flower-loving fly worth real cold, hard cash begins with government regulation. Indeed, it has its roots in two very important U.S. laws: the Clean Water Act (CWA) and the Endangered Species Act, both passed in the 1970s.

Although the CWA is basically designed to prevent the dumping of chemicals into the nation’s rivers, it is also in some respects a rather innovative biodiversity law — thanks to section 404, which attempts to prevent the placement of dredged and filling materials into the “waters of the US.”

Anyone wishing to dredge or fill a wetland considered of national importance in the United States must first obtain a permit through a program administered by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (EPA).

In considering whether to award this permit, EPA and the Corps are supposed to follow a process known as “sequencing,” in which the first step is to determine if the damage to the wetlands can be avoided. If it cannot, the next step is to minimize the damage.

Finally, the developer is supposed to offset, mitigate, or compensate for any damage that cannot be minimized.

This hierarchy should be considered in all forms of offsets, but it is not usually codified into law. Section 404 of the CWA is an exception. The law is also quite clear on what is considered appropriate compensation for the damage to wetlands: developers must “create, enhance, or restore” an amount equal to or greater than the amount being damaged in a wetland of “similar function and values” in the same watershed. In some special cases, protecting a similar wetland is considered suitable compensation, though this is rare. The law recognizes that not all wetlands are equal: Someone cannot damage a wetland in California and protect one in New Jersey.

The compensation for any development projects that harm wetlands — whether done by private developers or the government — can be undertaken by the developers themselves or by third parties. And the Army Corps of Engineers and EPA are charged with overseeing this process and making sure the compensation happens.

One of the most interesting repercussions of this law is that there are now private, for-profit, wetland mitigation bankers who make money by creating, enhancing, and restoring wetlands and then selling the resulting “wetland credits” to needy developers.

They buy wetland areas in parts of the United States that are likely to experience economic growth; they work with the Corps and EPA to get “credits” for their “creation, enhancement, and restoration” of wetlands (hence creating a “wetland bank”); and then they sell these wetland credits to developers who find themselves in need of compensation.

## Government Guides the Invisible Hand

In other words, wetland mitigation banking is possible because the government is restricting supply and allowing the market to set a price — a value — on this particular aspect of biodiversity.

In a way, it amounts to governments tinkering with the economic infrastructure in order to protect those aspects of biodiversity that should be valued, the externalities. And it is no small matter: Although there are no reliable figures on the size and value of wetland banking, the best guess is that there are more than 400 wetland banks throughout the United States, that the market for wetland mitigation is worth more than \$3 billion a year, and that entrepreneurial wetland mitigation bankers account for about one third of that business.

The rest is composed of people doing their own wetland mitigation in order to obtain permits or paying the government or nonprofit groups a fee instead of compensation.

Although wetland mitigation banking has proved to be a rather innovative concept — fueling the growth of a new “nature management industry” — it is important to point out that it is by no means perfect. Like all innovations, it has come in for some serious criticism. Some of these critiques are really about a reticence to

assign a dollar value to biodiversity, reflecting an inherent dislike for the use of markets and capitalist tools to protect nature.

The critics often argue that the only way to protect nature is for government to restrict its use and strongly enforce this restriction. Although there is clearly a place for this type of protection, there are other powerful tools that should be used as well.

Besides, without wetland banking, U.S. wetlands would be worth little or nothing, and they would continue to disappear under strip malls, airports, and highways. With banking, their loss has at least a very real monetary cost and can generate funds that may actually lead to the creation of new, very similar wetlands.

More important, this cost sends a signal: developers who want to develop a site that has wetlands will spend considerably more per acre, so they had better be absolutely sure they must have that particular site.

### The Shortcomings

Two other criticisms do merit concern, however. The first has to do with the fact that it is notoriously difficult to “create, enhance, or restore” wetlands, so the wetland acre used as compensation may be inherently “less valuable” in terms of biodiversity than the acre being damaged. Partly for this reason, many of the U.S. wetland banking systems require that each acre damaged be compensated with two, three, or more acres of wetland “created, enhanced, or restored.” It is a form of overcompensation or insurance and, while it alone does not resolve the matter, it does help.

So far, the studies on the quality of the wetlands created as compensation are mixed. In one study conducted in Ohio, scientists looked at the 12 oldest of the state’s 25 wetland mitigation banks. Although these had been studied and monitored by the Army Corps and EPA, the study found that many were not up to standard when checked against stringent scientific criteria. Indeed, against these measurements only three banks scored in the “successful category,” while five passed in some areas and failed in others. The remaining four failed nearly every assessment, functioning more like shallow dead pools than wetlands. More disturbing, none of the government agencies charged with oversight were taking the bank managers to task for this fact.

Overall, however, the study found that the banks were most successful when they maximized the areas defined as wetland, minimized areas of open water, and had similar plant and animal life to natural wetlands.

### Ensuring Quality

Despite its implicit criticism of banking, the study’s author, wetland ecologist John Mack, remains one of the more steadfast supporters of mitigation banking. He says that the conclusion from his study should not be that banking as a concept is flawed, but rather that — when done properly — it can succeed. He argues that by using better designs, performance standards, enforcement, financing, and an appropriate watershed approach, wetland mitigation banking can produce high-quality wetlands.

The second important criticism centers on how wetland mitigation banks are monitored and implemented. How is it possible to ensure that an acre of wetland protected today will still be there tomorrow, the day after, and the day after that?



There is also a related question: Will funding be ensured to maintain the newly-created wetland?

## Ensuring Longevity

To address these issues, the Corps and EPA require that wetland bankers provide both legal and financial assurances that the “created, enhanced, or restored” wetland will last (presumably) in perpetuity. The legal assurances usually take the form of conservation easements (legal restrictions on the use of land) held by third parties (usually a nonprofit or the government). The financial assurances can take a variety of forms. They are either trust funds set up to produce the interest necessary to run the bank or bonds or letters of credit that hold the bank financially liable for the protection of the wetlands.

In addition to these assurances, wetland mitigation banking requires a considerable amount of enforcement and verification. It needs the government agencies overseeing the system to continuously monitor and ensure that the promised wetland protection is delivered. Such “perpetual oversight,” however, is costly and is usually very difficult for understaffed and underfunded government agencies.

Nevertheless, as the mitigation industry grows it may generate the funds needed to monitor itself.

Despite these warranted criticisms, wetland mitigation is still probably a better system than the alternative — which, realistically, amounted to little or no real protection. Even if there were no wetland banking, roads would still be built, airports would still be constructed, and shopping malls would still go up. Wetlands, in other words, would still be damaged. History shows that society has not been very good at blanket prohibitions on the use of land.

And even if all further damage to biodiversity could realistically be prohibited, the problems of government enforcement and monitoring would still exist. It just would be spread out across tens of thousands of projects, and tens of thousands of acres of damaged wetlands, rather than across hundreds of wetland banks. In fact, numerous government officials report that the existence of wetland mitigation banking makes it easier for them to carry out their monitoring, enforcement, and protection work.

## Endangered Species: From Liabilities to Assets

If endangered species are so important, so valuable, why does the economic system see them as liabilities? The perverse unintended consequence of the Endangered Species Act — forcing people to see endangered species as a liability — is nothing new. Ever since the act was passed some 30 years ago, people have been complaining that listing an endangered species places an unfair burden on the private landowners whose land harbors these species.

In such cases, they argue, the incentive is not to protect an endangered species but rather to get rid of it fast, before anyone knows it is there. This is what some have called the “Three Ss Approach to Endangered Species Management”: shoot, shovel, and shut up.

Critics of the ESA have often used this attitude to argue that the act needs to be revised or even dismantled. But rather than throw the legislative baby out with the bathwater, there are other, less drastic approaches. One of these involves a process known as conservation banking.

## The Big Picture

---

In the 1990s, people began looking for a better way to accomplish the ESA's objectives — one that, instead of penalizing private landowners for harboring endangered species, would perhaps reward them. To do this, they created a system reminiscent of wetland banking. Under this system, landowners with an endangered species on their land can get a permit to harm that species (known as an “incidental take” permit in the euphemistic language of the government) if they can show they have compensated for it by creating habitat for that same species somewhere else.

Again, as with wetland banking, this has paved the way for private, for-profit, species bankers to create habitat for endangered species, get credit from the government for any new members of that species found on their land (“new” meaning above an initial baseline), and sell those credits to other developers who intend to damage that species' habitat or harm the species somewhere else.

Not much is known about the size and breadth of species banking across the United States, though it appears that there are more than 70 species banks and that these might trade anywhere from \$100 million to \$370 million in species credits each year.

Whatever the size, the use of conservation banking means that species banking, also known as “conservation banking,” can turn a species liability into a species asset. This is just what one company in Colton, California, discovered.

While the municipal government there sued the federal government over the Delhi Sands Flower-loving Fly, saying the government had no place regulating where people can build their houses, a sand and gravel company called Vulcan Materials Corporation acquired 130 acres of prime fly habitat — the largest remaining contiguous area of it in the Colton dunes.

But instead of hiring lawyers and attacking the fly's endangered species status, Vulcan decided to see if it could make the fly pay.

Working with the U.S. Fish and Wildlife Service and the Riverside Land Conservancy, Vulcan set up a conservation easement on the land, created a management plan for the fly habitat, established a baseline for flies on its land, and obtained the right to sell “fly habitat credits” above that baseline to needy developers.

The bank opened in June 2005 and by December had already sold three of its credits.

Although Vulcan will not officially release the sale prices, reliable sources estimate that at least one credit sold for \$100,000, although they also say the price has now risen to \$150,000 per acre, as mentioned earlier.

According to Kevin Klemm, the owner of the development company that was Vulcan's first customer, the credits were worth it. “The Vulcan Materials people were tremendous,” he says. “They were business-like and accommodating. They didn't waste any time. The bank is a tremendous value... I spent six years of my life trying to build 18 buildings.”

And presumably he got nowhere because the government made it illegal for him to harm the flower-loving flies. Now, with a bank from which to buy offsets, he has an option.

To people like Klemm, the rapid response mitigation solution now offered by the Vulcan bank is no doubt a blessing. And Vulcan is not alone.

There are now conservation banks in the United States that sell credits on everything from vernal pool fairy shrimp and valley elderberry longhorn beetle to tiger salamanders, Gopher Tortoises, and prairie dogs. As noted, these markets may be worth as much as \$370 million a year. The conservation of endangered species has thus become a very real, and very profitable, business opportunity.

## Government Programs: Benefits and Drawbacks

Outside the United States, several other countries are also experimenting with regulated biodiversity offsets. For instance, the Australian states of Victoria and New South Wales either already have or are setting up schemes similar to the U.S. system, although with a few important differences.

The BioBanking system in New South Wales has proposed a scheme whereby some areas would be deemed too sensitive for development. These would be “red-flagged” and would ideally be the sites where species banking would occur. In other words, the Australians are looking at addressing one of the main pitfalls of the U.S. system: a lack of broad-based, landscape-level planning to determine which areas are most needed for conservation. For now, it looks like the BioBanking scheme will be voluntary, but the hope is that, since compensation for damage is obligatory, BioBanking will be cheaper than the alternatives.

In the state of Victoria, the BushBroker scheme is mandatory and applies to native vegetation. The principle is simple: whoever harms native vegetation in Victoria needs to offset that damage by creating or protecting the same type of vegetation in the same bioregion.

Applying this scheme, on the other hand, is extremely complicated. There are literally dozens of vegetation systems and bioregions, which makes finding the right match a daunting task. To address this problem, the government of Victoria is building a sophisticated computer matching system that it expects will be operational any day now.

## The Challenge of Governance

While cap-and-trade regulated offset schemes to protect biodiversity can indeed create real markets and can be extremely powerful when used correctly, they also require strong government oversight, effective legal systems, enforcement of rules and regulations, and robust financial institutions.

These conditions may be found in some industrial countries, but they are not the conditions of much of world — especially in those parts that hold most of the world’s biodiversity, places like parts of Central and South America, Congo, China, Indonesia, Madagascar, and Mexico.

So, what can be done in those parts of the world? Fortunately, the underlying concept behind both conservation banking and wetlands mitigation banking — that is, putting a value on biodiversity — applies in all countries, even if the exact systems for providing these payments may not. Even the U.S. government has a multimillion-dollar-a-year program to help farmers and private landowners conserve.

## The Big Picture

---

It comes in the form of Farm Bill payments such as the Wetlands Reserve Program, the Conservation Security Program, the Conservation Reserve Program, and the Environmental Quality Incentives Program.

In Brazil, the government requires that a minimum amount of a landowner's territory be kept in forest cover. There is also a law on Brazil's books that requires compensation for damage to biodiversity, although the laws to determine that compensation are not adequately established yet. Similarly, in places as far afield as South Africa, Colombia, and the European Union, laws requiring or encouraging biodiversity offsets are either being considered or already being implemented.

The Chinese government has long had a program known as Grain for Green (the official title translates as the Sloping Lands Conversion Program, or SLCP) that pays farmers to keep forest cover on hillsides. Its aim is to help conserve watersheds and prevent floods, but it also affects biodiversity conservation.

This is not a market-based system, however; it is a system of government subsidies and payments. The money comes directly from tax revenues and is redistributed based on certain established criteria. While the SLCP system does help increase the value of standing forests (and has an astounding budget of \$43 billion over 10 years), it does not directly link the users of the biodiversity services with the providers of those services. Government mediates the transaction, so the users of the service are not receiving information on the cost of their use.

Mexico is introducing a similar system. It was modeled on a program for water conservation in the country known as Pago por Servicios Ambientales Hidrológicos (PSAH, or Payment for Environmental Hydrological Services). The PSAH is interesting in that it collects a fixed amount of revenues from water users and then redistributes it to key targeted forested watersheds across the country.

The principle here is that by helping protect forested areas in key watersheds, the payments will help support the provision of water-related ecosystem services throughout the country. The program started in 2003 and pays between \$30 and \$40 a hectare for forest conservation, depending on the type of forest being protected. Currently the program is paying for the management of close to a million hectares.

Building on its success with water services, Mexico has received a grant from the Global Environment Facility to establish a similar program to make payments for biodiversity conservation. The problem with this approach is twofold. First, as in China, the money is coming from philanthropic sources or the government. Second, the payment and the payer are severed from the actual service being received. In other words, while all Mexicans contribute a bit of the money they pay for water to the PSAH, they often do not know they are making this contribution. And the money they pay is not necessarily used in the watersheds that supply those individuals with water. Again, the link between buyer and seller is not direct. This makes it difficult for users of the service to make decisions based on the economic costs of their use.

One of the most talked about payment for ecosystem services programs, as these are often called, is the Pago por Servicios Ambientales (PSA) program created by Costa Rica in 1996. Private landowners in Costa Rica who protect their forest cover receive a payment from the National Forestry Trust Fund. These payments are made at a base rate of \$40 per hectare but can vary depending on type of forest cover. Most of the money for this trust fund comes from a tax added to fuel sales in Costa Rica, but this is supplemented by "environmental credits" sold to businesses and other sources of international finance.

Between 1996 and 2003, the Costa Rican PSA program had enrolled more than 314,000 hectares of forested land, transferring more than \$80 million to landowners in the process.

Once again, this is a government-run program here the user and provider of the biodiversity services are not closely linked. Also, like China's Grain for Green program and Mexico's PSAH, the price per hectare of biodiversity is set by government, not via a direct market-based mechanism. They are in effect government monopsonies (one buyer without competition, the opposite of a monopoly) for biodiversity services, and as such they may be paying too little or (though this is less likely) too much for the conservation of biodiversity. The price is largely arbitrary and based on the government's ability to pay rather than on supply and demand for the service.

Despite these drawbacks, the programs in China, Mexico, and Costa Rica have been extremely successful at giving added economic value to biodiversity and, some observers say, have also been successful in their overall goal of increasing forest cover.

A particularly interesting and different approach to payments for biodiversity services is found in Victoria in Australia. Through two programs there — known as BushTender and EcoTender — the state has established a reverse auction system for providing government payments to private landowners who conserve local biodiversity (among other goals).

The pilot for BushTender took place in Victoria in 2003, and according to Mark Eigenraam, one of its architects, it “used an auction system to distribute environmental funds to landholders who were interested in improving terrestrial biodiversity on their properties. The implementation of BushTender led to 5,000 hectares of native vegetation on private land being secured under management agreements. In economic terms, it created the supply side of a market for nature conservation and generated significant cost savings when compared with previous grant-based systems for distributing conservation funds to landholders.”

BushTender's success is now being followed up with EcoTender, in which the state is inviting local landholders to submit competitive “bids” for government funding to pay for improved management of remnant vegetation and re-vegetation on their properties.

“Where BushTender focused on a single environmental outcome (increasing terrestrial biodiversity), EcoTender aims to achieve multiple environmental benefits, including improvements in saline land and aquatic function,” explains Eigenraam.

What is interesting about BushTender and EcoTender is that they use government's monopsony buying power to invite bids that effectively serve to discover the “best” price at which biodiversity conservation will be achieved. Nevertheless, the buyer is once again the government using tax revenues, so the connection between the buyer or user of the biodiversity services and the seller is still not direct.

## Voluntary Biodiversity Offsets

Beyond government regulation, numerous companies have begun to set up biodiversity offsets voluntarily in places like Qatar, Madagascar, and Ghana because they think it makes good business sense to do so. Like voluntary carbon markets, the number and investment in such offsets is presently modest. But they are likely to become much more widely used as a part of standard business practice.

Some observers believe that they could serve as the precursors to larger, more broad-based biodiversity markets in the long term. Essentially, they demonstrate that there can be a business case for investing in biodiversity conservation.

### Expanding the Business of Biodiversity

To understand whether, when, how, and where voluntary biodiversity offsets should be undertaken, the Washington-based nongovernmental group Forest Trends established the Business and Biodiversity Offsets Program (BBOP). This is a partnership of over 50 companies, governments, conservation experts, and financial institutions from many different countries and led by Forest Trends and Conservation International.

The BBOP partners believe that biodiversity offsets may help achieve significantly more, better, and more cost-effective conservation outcomes than normally occur in the context of infrastructure development. The program aims to demonstrate conservation and livelihood outcomes in a portfolio of biodiversity offset pilot projects; to develop, test, and disseminate best practice on biodiversity offsets; and to contribute to policy and corporate developments on biodiversity offsets so they meet conservation and business objectives.

Companies undertake biodiversity offsets for one or more of three reasons: they are required to by national legislation (as in the United States, with wetland mitigation banking and conservation banking), they are encouraged to or facilitated by Environmental Impact Assessment legislation or other planning procedures, or they find a legitimate business case to get involved.

BBOP staff have identified numerous benefits for companies in doing this; namely, voluntary offsets can help companies:

- ensure continued access to land and capital and to the license to operate;
- bring competitive advantage or favored status as a partner;
- increase investor confidence and access to capital;
- reduce risks and liabilities;
- ensure strong and supportive relationships with local communities, government regulators, environmental groups, and other important stakeholders;
- influence emerging environmental regulation and policy;
- assure “first mover” advantage for innovative companies; and
- maximize strategic economic opportunities in emerging markets (for instance, establishing companies to implement offsets).

Currently, BBOP is working with partners on projects in a variety of countries, including Ghana, Kenya, Madagascar, Qatar, South Africa, and the United States, and is exploring projects in Argentina, China, Mexico, and New Zealand. Some of the companies the program is working with or in discussions with include Newmont Mining, Rio Tinto, Shell, and AngloAmerican.

As these experiences mount up, and as case studies become available on best-practice biodiversity offsets, it is likely that both the supply and demand for these offsets will grow. Countries that establish clear policies may improve land use planning and use market mechanisms to create aggregated offset areas that achieve significant conservation outcomes in high biodiversity-value areas.

## How Much is Nature Worth?

Whether through voluntary offset mechanisms, government-mediated payment schemes, or full-fledged markets in offsets, the concept of payment for biodiversity services is beginning to take hold. More important, these approaches are beginning to subvert the current economic model that is blind to the value of biodiversity, to the services that species and ecosystems provide, and to the costs inherent in destroying the natural wealth on which human well-being depends.

The problem these systems are trying to address is self-evident: When iPods are valued over whale pods, the economic system will deliver ever more species of iPods and wipe out yet another species of whales. When wet-lands are seen as nothing more than mosquito-infested swamps, they will lose out to shopper-infested malls. And as land becomes ever more scarce, the problems will simply be aggravated.

The economic system is not broken. It is doing exactly what it was set up to do: deliver more of what people value — or at least more of what the imperfect price signals say people value — and less of what they don't.

The solution to the problem may actually lie in using markets and the economic system to our advantage. Imagine how powerful it would be if market forces — the same market forces that have inexorably pushed for the destruction of rainforests and the extinction of countless species — could be used to protect species, to give them a real value in people's everyday decisions of what to eat, what to wear, and what to buy.

To return to the questions at the start of this chapter: How much should society be prepared to spend to protect nature? The answer will in large measure determine whether humanity ends up living in a world of whales, wild tigers, and wetlands or a world of pavement, iPods, and pollution.

Better yet, we can hope that through a form of economic jiu-jitsu these market mechanisms will make it possible for the pavement and the iPods to co-exist comfortably with the whales and the wetlands.

*Ricardo Bayon is a Partner and co-founder of EKO Asset Management Partners, a new breed of "merchant bank" seeking to influence, encourage, and profit from new and emerging markets for environmental commodities (carbon, water, and biodiversity). Formerly he helped found and was the Director of the Ecosystem Marketplace. he can be reached at [rbayon@ekoamp.com](mailto:rbayon@ekoamp.com).*

# Water Trading: The Basics

By The Ecosystem Marketplace Team

*Water trading has been hailed as the “next carbon”, and schemes for valuing and trading both water usage and water “inputs” are proliferating across North and South America, Asia, and Africa. The Ecosystem Marketplace reviews the fundamentals of this promising ecosystem market.*

**16 April 2008** | In the early 1980s, the de la Motte family realized that cow dung and fertilizers were finding their way into the aquifer that fed the family’s famous (and lucrative) mineral water plant in the town of Vittel, in northeastern France, after upstream farmers had replaced natural, filtering grasslands with corn.

By the end of the decade it had become clear the problem needed an innovative solution — one Vittel’s new owner, Nestle, spent the 1990s hammering out with local farmers. The company purchased 600 acres of sensitive habitat and signed long-term conservation contracts with farmers whose corn and cows had polluted downstream waters.

Nestle now pays these farmers to manage their animal waste, graze their dairy cows the old-fashioned way, and reforest sensitive filtration zones. Though costly, it’s a lot cheaper than the alternative. Competitor Perrier (now also owned by Nestle) once spent more than \$260 million on a global recall after benzene made its way into millions of its distinctive green bottles, and its market share has never recovered.

## Payments for Ecosystem Services

Vittel’s action, like New York City’s payment to upstate farmers, has become a textbook example of a successful “PES” deal — short for Payments for Ecosystem Services — or, in this case, “payments for watershed services” (PWS). Such schemes, as frequent visitors to this site know, are based on the premise that ecosystems deliver valuable services that most of us take for granted — like filtering water in the above example — but whose value our economy doesn’t normally take into account.

PES schemes try to quantify the economic value of services that an ecosystem provides, and then either entice or mandate those who benefit from the service to pay the people who maintain them.

Unfortunately, for every successful PES scheme, there are scores of failures and near misses, and much debate about what works and what doesn’t.

## Trading Water: Quantity and Quality

The Kyoto Protocol has put the trading of greenhouse gas emissions and offsets on everyone’s radar, but emissions trading actually began decades before the Kyoto Protocol was signed. The US Environmental Protection Agency’s (EPA) Emission Trading Program started in 1974, and allows a limited exchange of emission reduction credits for five air pollutants: volatile organic compounds, carbon monoxide, sulfur dioxide, particulate matter, and nitrogen oxides.



It kicked in at the height of the environmental movement in the United States. The first Earth Day was fresh in everyone's mind, and the federal Clean Water Act (CWA) and the Endangered Species Act were laying the groundwork for today's markets in water and biodiversity.

## A Wetlands Savings Account

So-called "mitigation banking" covers the quantity of biodiversity and wetlands — which are more than just standing bodies of water. A well-functioning wetland plays a key role in filtering water and thereby "delivering" the ecosystem service of reliable water quality, as well as providing habitat for many plants, insects and animals that are part of the biodiversity of an area. These "services" are difficult to quantify — one reason environmentalists are up in arms over schemes that replace true wetlands with ponds and other bodies of isolated water.

Mitigation banking involves building up reserves of water capital, and is a key response to the CWA's section 404.

The Act mandates that anyone who plans to dredge a wetland that nurtures other waterbodies try to find a way to avoid its destruction. When this is not possible, the developer must first get a permit through a program administered by the U.S. Army Corps of Engineers and the US EPA. Then, if a permit is granted, the developer must "establish, enhance, restore or preserve" an amount of wetland equal to or greater than what is being dredged — usually in the same watershed.

Mitigation banks are essentially wetlands that have been pro-actively established, enhanced, restored, or preserved — in exceptional circumstances when the land was under significant threat — with the goal of generating credits that can be sold to developers later as offsets. The CWA requires mitigation banks to replace function as well as acreage of jeopardized wetlands, although many complain that the function requirement is often overlooked.

## The Drive for Distribution

In addition, you have schemes that cover the distribution of water for drinking and agriculture, and no one has taken this further than the Australians, who've turned water into a commodity that is almost as easily-traded as electricity is in other parts of the developed world.

But it's in the developing world that such schemes could have their greatest impact. Studies show that the poorest usually pay the most for clean drinking water, while many industries simply waste it for free. Trading could put a uniform price on clean, delivered water, thus both reducing industrial waste and enabling delivery to areas that currently have poor access for drinking.

## Using Markets to Control Pollution

So-called "nutrient trading" covers the bulk of the quality side — although the boundaries between quantity and quality blur and overlap.

Most watersheds contain two types of polluters — "point" sources and "nonpoint" sources.

## The Big Picture

---

Point sources are the ones we hear about the most: industrial enterprises or urban waste treatment plants that directly pollute a watershed from a single pipe or point. Most point sources are regulated by the National Pollutant Discharge Elimination System (NPDES), and have been the cornerstone of water pollution control in the US since the passage of the CWA.

Nonpoint sources, on the other hand, account for a whopping 80% of the nitrogen and phosphorous that ends up in US waters — and most of these are unregulated, for a variety of political, social, economic, and logistical reasons.

These sources include farms, such as those that leached into the de la Motte's watershed, as well as septic systems and new development whose pollution washes into a watershed over a diffuse area, usually in the form of run-off.

When run-off comes from agriculture, it's called a "nutrient" — but it's not the kind of nutrient your mother encourages you to eat with your Wheaties. Instead, these nutrients feed organisms that gobble up oxygen and lead to "dead zones" like those found in Europe's Black Sea. Such dead zones have been labeled a greater threat to humanity than global warming by the Millennium Ecosystem Assessment, a United Nations-sponsored project that engaged over 1,300 scientists and is easily the most extensive research program to date focusing on ecosystems.

The technology for alleviating the problem of agricultural run-off is readily available. Farms can reduce their run-off by changing the way they till, plant, or fertilize — at a cost of about 1/65 of what factories in the developed world would pay to reduce their levels of pollution emissions, according to one study.

That's where "nutrient trading" schemes come in. They put the reduction burden on factories and other point sources, but give them a chance to pay nonpoint polluters to reduce their pollution outtakes instead — so-called "point-nonpoint" transactions. In theory, industrial polluters will opt to pay farmers to reduce their pollution emissions along a river when those factories can't afford to invest in technology to further limit their own discharges.

This is the current holy grail of water quality trading, but most activity remains "point-point" — partly because nonpoint sources are difficult to monitor, but also because it's difficult to measure results. Also, non-regulated entities such as farms may be afraid of getting involved in voluntary schemes, no matter how lucrative, because they fear it will bring them into what they see as a regulatory boondoggle. In the weeks ahead, we will be addressing solutions on the table for addressing these and other issues.

## The Beat Goes On

And there is, indeed, plenty on the table — with water schemes being proposed and implemented across Latin America, Asia, and Africa — as well as the United States, which got started in the early 1980's with point-point effluent trading on Wisconsin's Fox River and point-nonpoint trading on Colorado's Dillon Reservoir.

In 1996, the US EPA formally threw its support behind these trading programs, and several state initiatives have followed suit: Michigan with draft rules for nutrient trading in 1999, followed by the Chesapeake Bay Program in 2001.

The Chesapeake Bay Program, a multi-jurisdictional partnership that is working to restore and protect the Bay and its many resources, encompasses the three Bay states (Maryland, Pennsylvania, and Virginia), the District of Columbia, and the US EPA. But rather than being a unified trading program across the entire watershed, it is more of a hodgepodge of efforts with each state running its own trading scheme.

In early 2003, the US EPA released its Water Quality Trading Policy, identifying general provisions the agency considers necessary for creating credible watershed-based trading programs. Over a decade in the making, this policy identifies the purpose, objectives and limitations of these and other trading opportunities. The EPA has even gone so far as to publish a map of trading programs in the US and a trading toolkit.

The policy is flexible by design, letting states, interstate agencies, and tribes develop their own trading programs that meet CWA requirements and localized needs. Critics, however, say it's too flexible, failing to identify tradable pollutants and other basic parameters. This leaves the system undefined and fails to generate the kinds of certainty a true market requires.

## Drivers for Water Quality Trading in the US

Two major factors in the mid to late 1990's prompted not only the rapid increase of water quality trading programs in the US, but also a fundamental change in the way that water quality trading programs are developed and implemented. The first factor is the highly-publicized success of the Acid Rain Program, which demonstrated the efficacy of market mechanisms when coupled with proper government enforcement mechanisms. This convinced many policy makers that emissions trading could be applied to water pollution control.

The second factor is the increasing number of so-called "TMDLs" (Total Maximum Daily Loads) being developed by states and US EPA as mandated by the CWA.

A TMDL is the maximum amount of pollution that a water body can assimilate without violating state water quality standards, and individual states determine the specific TMDLs for specific pollutants in specific bodies of water. TMDLs don't just cover chemicals, but also things like temperature. In theory, they can act as de-facto caps for emissions in cap-and-trade water schemes, and approaches based on TMDLs and a handful of other tools are already being tested across the United States.

The calculations themselves are complex and the subject of much debate, but the existence of TMDLs identifies the sources and estimates the quantity of pollutants targeted for possible trading. This debate, in part, helps create the driver for a market — for in a well-structured market, the price of a pollutant will be tied to the actual amount of reduction necessary to meet the TMDL, and not to an arbitrary cap.

Water quality trading can also occur on a "non-TMDL" waterbody (one that is not impaired or one that the government has not gotten around to developing a TMDL for), and trading can occur much sooner because nonpoint sources do not have to meet the TMDL minimum before a trade can occur. This is generally referred to as "pre-TMDL" trading.

This allowance was made because the TMDL minimum threshold may, in many cases, be too high and too expensive for nonpoint sources to meet, and could discourage them from pursuing a trade.

## The Big Picture

---

For a trade to occur in a TMDL waterbody, nonpoint sources must first meet their load allocation, then any additional amount of reduction they can accomplish can be sold to offset point source loads.

The TMDL trading unit is the specific pollutant identified in the TMDL. For example, in nitrogen TMDL, the unit is one pound of nitrogen removed from the waterbody; for a temperature TMDL, the unit is one degree of temperature lowered in the waterbody.

Despite the availability of these promising mechanisms, however, demand has been slow to materialize. For these markets to reach their true, enormous potential, awareness must be spread across both the private and public sectors — and to the community at large.

*This introductory was compiled from essays submitted to Ecosystem Marketplace over the past two years, and we would like to thank Mark S. Kieser and “Andrew” Feng Fang of Kieser & Associates, Ricardo Bayon of EKO Asset Management Group, Amanda Hawn of New Forests, and regular Ecosystem Marketplace contributors Alice Kenny and Erik Ness.*

*Steve Zwick is managing editor of Ecosystem Marketplace. He can be reached at [SZwick@ecosystemmarketplace.com](mailto:SZwick@ecosystemmarketplace.com).*

## Between Purity and Reality: Taking Stock of PES Schemes in the Andes

by **Sven Wunder**

*Many people talk about payments for ecosystem services (PES), but how much is actually going on out there in the field? Sven Wunder, Senior Economist at the Center for International Forestry Research (CIFOR) in Belém, Brazil, tells the Ecosystem Marketplace what he found in their 2006 survey of field initiatives in the Andes.*

**27 October 2006** | Six years ago, the International Institute for Environment and Development (IIED) published a desk study assessing Payments for Ecosystem Services (PES) worldwide, and in 2006 the Center for International Forestry Research (CIFOR) and its partners concluded national-level PES reports that took IIED's effort one step further. In four Andean countries (Bolivia, Ecuador, Colombia and Venezuela), we field-assessed a series of PES schemes (incl. the ones reviewed by IIED). We were looking for real-world schemes that fit a simple, theoretically founded definition of PES: a voluntary, conditional agreement between at least one buyer and one seller over a well-defined environmental service (or a land use likely to produce the service). The results gave us a diagnostic of where PES implementation stands in the Andean region with respect to schemes dealing with carbon, watersheds, scenic beauty and biodiversity protection.

In **Bolivia**, our published report documented a growing demand for watershed protection and ecotourism (scenic beauty). But only a few genuine PES pioneers exist; most initiatives lean more towards traditional project approaches. There is an ideologically motivated skepticism towards PES as an alleged “neoliberal” approach to natural resource management, but also real concerns about disguised privatization of public-access resources such as water, or about lacking key preconditions for PES, such as secure land tenure. Future options for PES expansion are probably greatest in Bolivia's lowlands (“Media Luna”), where PES-like direct economic incentives are currently the most accepted.

**Ecuador** was the country with the richest portfolio of PES implementation. Two pioneer schemes that fully fit our PES definitions have been running for 5-10 years: the PROFAFOR carbon sequestration program and the Pimampiro municipal watershed scheme. These forerunners have now inspired a new generation of local, self-organized PES schemes covering all four service types. Although the central State plays no role in any of these initiatives, the political and ideological climate towards PES is much less hostile than in Bolivia, providing an optimistic outlook for PES.

**Colombia** was probably the most advanced Latin American country in terms of creating innovative mechanisms for domestic environmental financing. While Colombia thus widely charges its environmental service users, the country is less advanced than Ecuador in terms of compensating the service providers.

Most environmental resources go to traditional project activities, studies, and administration. A national scheme for protecting critical watersheds had been designed, but was never implemented. Significant PES potential seems to lie at the district level (corporaciones), where the bulk of environmental finance is administered.

In **Venezuela**, no genuine PES or PES-like schemes existed at that point, mostly because of political skepticism about the mechanism. However, a hitherto under-utilized national program (Subsidio Conservacionista) constitutes a potential legal framework for PES. Furthermore, increasing demand for environmental services, especially for watershed protection, suggests a large potential for (and local-level interest in) PES. In some of the six screened sites, PES would seem feasible, if the service users' willingness to pay can be captured. Unlike in Ecuador, in Venezuela this may only be achieved with close participation of the State.

In summary, PES development in the Andean region is uneven, with some countries (Ecuador, Colombia) being more advanced than the others (Venezuela, Bolivia) — and political-ideological factors explain much of the variation. Watershed services clearly dominate, and demand for them is rapidly expanding, followed probably by scenic beauty, carbon and biodiversity services (in that order). All running schemes are self-organized by buyers, sellers and intermediaries, circumventing the power of the central State. Basically all schemes are bilaterally negotiated deals, not genuine “markets”.

Furthermore, the bulk of real-world schemes are, at best, “PES-like” schemes, i.e. direct economic incentive packages that satisfy most but not all of the PES definitions. In particular, two shortfalls are common. First, many schemes have failed to cultivate buyers among the service beneficiaries, drawing instead on external donors' contributions. The second-most non-met PES condition is “conditionality”: most implementers seem to shy away from the business-like feature of only paying the providers if they actually deliver the agreed-upon service. In general, they are too concerned about disrupting their relationship with poor rural farmers to withhold payment.

Is it a problem that Andean PES reality does not live up to what the PES theorists had imagined in their scientific articles? In principal, it seems rational not to use the infamous one-size-fit-all model, and to carefully customize PES deals to local conditions instead. However, we believe that many of the existing PES-like initiatives could drastically increase their chances of success if they managed to adhere more closely to the pure PES principles. For instance, when service users do not pay, it is almost impossible to make a PES scheme sustainable, as the donors will sooner or later withdraw. And when there is no strong conditionality, service delivery will in most cases sooner or later become compromised. Hence, following a simple set of guiding PES principles is not just a question of academic grace; it impacts directly on the functionality of the implemented mechanism.

*Sven Wunder is Senior Economist at the Center for International Forestry Research (CIFOR) in Belém, Brazil. He can be reached at [s.wunder@cgiar.org](mailto:s.wunder@cgiar.org).*

# More Corporations Seek Solutions to Global Water Crisis

by Tracy Stanton

*An increasing number of corporations have come to realize that their economic survival relies on nature, and a growing number are investigating market-based tools for meeting the looming global water challenge. Many of these tools are on display at World Water Week, which runs through Saturday, August 22, in Stockholm, Sweden.*

**20 August 2009 | Stockholm** | A growing number of voices from the corporate world are calling for new thinking and positive action on global water-related challenges and their impact on the environment, human health, and the economy with attention to poverty — all under the umbrella of adaptation to climate change.

That, at least, is the message being hammered home at World Water Week through Saturday, August 22.

What was once the domain of a company's corporate social responsibility program is now a strategic business concern, and more and more corporations are re-examining the role that water resource inputs play in their production cycle and turning to new tools such as water 'footprinting,' which are helping businesses evaluate and address risks throughout the entire supply chain of water-intense products such as beverages, food and clothing.

The Water Footprint Network (WFN), a Dutch non-profit foundation, is an international network of partners who are interested in water resource management. It was formed to promote sustainable, fair and efficient use of fresh water resources, and has created tools to help individuals, businesses and governments evaluate their direct and indirect water use of water. The idea is that by increasing understanding of water consumption and the impacts on fresh-water systems, individual behavior or management systems can adapt to better offset both risk and ecological impacts.

WFN members SABMiller and WWF — a brewing company and a non-governmental organization, respectively — have been working together to establish water footprints of the beer value chain in South Africa and the Czech Republic.

The effort focused on water supply issues, but in the case of the Czech Republic, the report shows that quality issues can also be identified using the footprinting tools.

In a special session titled: "Water Footprint: A New Entry Point for Water Policy and Corporate Water Strategy," Coca-Cola highlighted the water footprinting efforts of one of its most recognized products: the half-liter plastic bottle of Coke Classic. Denise Knight, Water Sustainability Manager for the Coca Cola Company, gave an overview of the footprinting process as part of the company's overall water stewardship journey. By improving water use by 20% by 2012, Coke and its bottling partners aim to be the most efficient users of water among peer companies.

Coke's overall water conservation goals are based on a REDUCE, RECYCLE, REPLENISH strategy and informed by their operational water footprint. Similarly, SABMiller recognized a need to incorporate responsible water use throughout their operations and encourage their suppliers to do the same. They set a target of reducing water use per litre of beer by 25% by 2015.

Throughout the week, in addition to water footprinting, other business-themed seminars and reports are highlighting the many new initiatives targeting corporate engagement in water stewardship. The CEO Water Mandate is a public-private UN initiative launched in 2007 to help companies develop, implement and disclose water sustainability policies and practices.

The World Business Council for Sustainable Development (WBCSD) and the International Union for the Conservation of Nature (IUCN) have also used the event to launch a new report, "Water for Business: Initiatives Guiding Sustainable Water Management in the Private Sector." The report is a guide to the different assessment tools, approaches and methodologies being used to support sustainable water management and aims to help build a common language in support of water stewardship schemes across the sector.

On Wednesday, the 2009 Stockholm Industry Water Award was given to Trojan Technologies of Canada. Based in Ontario, Canada, Trojan produces UV disinfection systems for industrial applications, municipal water and wastewater treatment, commercial integration, residential use, and elimination of environmental contaminants from wells and other sources of drinking water, including reused water. Trojan has led the worldwide drive for commercial, engineering, and regulatory acceptance of the technology as an environmentally sound alternative to traditional chlorine-based water treatment with installed systems at more than 5800 facilities in more than 80 countries.

Celebrating its 10th anniversary during this year's event, the Stockholm Industry Water Award honors contributions by business and industry that improve the global water situation through improved performance in production processes, new products, and management, as well as innovations in water and wastewater process technologies. It was established in 2000 by the Stockholm Water Foundation in collaboration with the Royal Swedish Academy of Engineering Sciences and the World Business Council for Sustainable Development. The award program is administered by the Stockholm International Water Institute, which serves as host and organizer of World Water Week.

*Tracy Stanton is the Water Program Manager of the Ecosystem Marketplace. She can be reached at [tstanton@ecosystemmarketplace.com](mailto:tstanton@ecosystemmarketplace.com).*



# How the US is Forging a National Ecosystem Marketplace

by Alice Kenny

*The US Department of Agriculture's new **Office of Ecosystem Markets and Services (OEMS)** is just getting off the ground, but once underway it should lead to better coordination not only among agencies charged with regulating various ecosystem service markets, but also among markets for water, biodiversity, and of course carbon.*

**2 July 2009** | Shoehorned into temporary quarters at the Department of Agriculture Building in Washington DC, Sally Collins, the first-ever head of the newly-created Office of Ecosystem Services and Markets (OESM), juggles her job while maneuvering her department's move to permanent offices downtown. The new job, novel business, and temporary home fit well with the uncharted challenges OESM has begun to navigate.

OESM, launched by the Bush administration and embraced by the Obama team, is tasked with developing the first-ever standardized, universal guidelines for developing procedures to measure environmental services benefits, as well as a protocol to report those benefits and "a registry to collect, record and maintain the benefits measured," in the words of the 2008 Farm Bill that led to the office's creation (you can download the relevant section to the right).

## One Registry for All Credit Types

The new agency will rely on government and private experts to establish an overall eco-market infrastructure, Collins says. That means developing a single standard for each market, and then finding a way to see the creation of a registry where carbon, wetlands, nutrient, biodiversity and other ecocredits can be tracked to make sure the same environmental benefits aren't being sold twice.

At this point, it's not clear what form that "registry" would take, but it's unlikely the office will create one from scratch.

"Given the evolutionary nature of these markets, it's difficult to tell what the appropriate structure is for registries, let alone what our role should be," says Mark Nechodom, the office's deputy director. "It may turn out that the best way for us to fulfill our mandate is to provide light-touch oversight and guidance, and not necessarily a heavily-laden government structure."

He says it's conceivable the office would simply coordinate the activities of existing registries, as the Voluntary Carbon Standard did when it created a meta-registry of three different registries.

Rainer Musier is vice president of one of those registries, California-based APX. He says he is not concerned about overlap with OESM.

“Any new standards simply expand the environmental marketplace which is good for the marketplace, good for our clients and good for the environment,” he says.

### Greater Accessibility

Whatever emerges, OESM should make it as easy for farmers to trade in the multiple benefits their land may provide — such as flood-control and carbon-sequestration — as it is for them to sell their crops.

“We’re looking at the farm of the future with multiple income strands from a single piece of land,” Collins says.

Some hail this multi-ecomarket framework as the opportunity of a lifetime.

“This is the new Earth Day,” says Richard Brekenridge of the Illinois EPA. “It’s looking at the entire world: land, water, air, carbon, and methane. The challenges and opportunities are fascinating.”

But others reeling from the financial-market meltdown question the value of formalizing this office, placing it under the auspices of the United States Department of Agriculture (USDA) and pushing the environment further under the protection of market forces.

Collins acknowledges these concerns, and says they underline the importance of ensuring OESM is run properly. With global warming increasing, wetlands decreasing, and endangered species disappearing despite regulations enacted to preserve them, she adds that it’s clear the current system isn’t getting the job done.

“We already figured out we can’t regulate our way out of the problem,” she says. “We have to come up with a system to engage the market, monitor the heck out of it, but we have to act fast.”

### Pushing from Carbon to Green

Atmospheric levels of carbon dioxide, the principal heat-trapping gas, are rising at accelerating rates, according to the National Oceanic and Atmospheric Administration (NOAA). Coastal wetlands that prevent floods and trap toxins continue to disappear, reports both NOAA and the US Fish and Wildlife Service. Regulations designed to preserve essential environmental assets have clearly proven insufficient.

“Regulations are important, but they cannot achieve our goals in and of themselves,” says Annie Petsonk, international counsel for Environmental Defense, a non-profit organization whose mission links science, economics and law. “They cannot regulate private landowners into restoring habitat or sequestering carbon.”

As a response, wetlands, waterways, air and animals have been preserved, some better than others, for the past three decades through cap-and-trade mechanisms that allow polluters to purchase credits from businesses that pollute less and preserve more. But many, Collins says, “lack consistent standards and transparency, making them inefficient and difficult to access.”

OESM was constructed to change that.

## Conductor Collins

With a staff that may expand to 12 this year and 25 during the next six years, the office will “be more like an orchestra leader than the orchestra itself,” Collins says. Its role will be to inform markets, while the EPA, Army Corps of Engineers and other federally-established eco-cops will maintain their roles of policing them.

The agency plans to bring together scientific experts to establish standards that are reliable enough to encourage investment but flexible enough to assure environmental protection. Standards will be open for amendment every five years.

“We have to be adaptable and humble in the way we approach this,” Collins says.

## Agriculture and the Environment: Friends or Foes?

One reason Congress placed the Office under the authority of the USDA is the department’s long-established relationship with private landowners and its record of promoting the sale of the ecosystem services they possess. This USDA/OESM relationship makes sense to many, including Peterson.

“The government does not have enough money to buy all the land needed, and the USDA has the largest reach to private landowners,” she says.

Political ecologist and University of Kentucky professor Morgan Robertson, however, isn’t so sure.

A self-described “skeptical advocate” of ecosystem markets, he worked with the USDA when he helped write the new wetlands rule. From this experience, he says that the “USDA’s role is pro-farmer and not always environmentally friendly.”

Prioritizing farmers over the environment could shortchange both in the long run, Robertson warns. Environmental assets and markets could be destroyed, leaving farmers without either income stream.

Moreover, says Robertson, environmental science may not be developed sufficiently to enable the OESM to find the correct balance with economic forces.

“I’m concerned, given my previous experience in water quality, that criteria may not be precise enough to be able to see closely enough whether ecosystem services are being provided.”

Getting it right, he added, is essential. “A poorly- run ecosystem services market looks a lot like the next subprime mortgage crises,” he said. For example, look at carbon trading. “If you open up a box of CO2 reduction and it turns out there’s nothing there, then whatever nascent market you have will collapse.”

## Courage of a Convert

Collins addresses these concerns with the courage of a convert.

“I was one of the last people that could stand the idea of putting economic value on things I love like wildlife habitat,” says the 25-year veteran of the USDA Forests Services. “This is a place I’ve come to with a lot of thought, reading, internal strife and seeing what’s happening to our environment.”

## Global Developments

---

Placing OESM under the auspices of the USDA, she says, allows it to take advantage of the USDA's access to farmers and the land and ecosystems they control.

Getting this right, she adds, will take time.

While many environmental market supporters hoped that the creation of OESM could lead to imminent stacking of services on a landscape scale, Collins predicts it will take five years to complete sufficient research and build the infrastructure needed to put this type of comprehensive environmental market in place.

“What it comes down to for me,” Collins says, “is we’ll never have the science perfect; ecosystems are unbelievably complex. But we have no choice. We’re losing services we depend on, so we have to engage the economic sector.”

*Alice Kenny is a prize-winning science writer and a regular contributor to Ecosystem Marketplace. She may be reached at [alicekenny1@gmail.com](mailto:alicekenny1@gmail.com)*



# Local Developments

## Payments for Ecosystem Services in Gabon's Mbé Watershed

by **Emilie Filou**

*As mining and logging spread across Gabon's Mbé watershed, they threaten the river that nourishes the capital city, Libreville, and also drives the city's turbines. USAID and the Global Environment Facility are helping the government of Gabon and the Wildlife Conservation Society entice electricity users into paying to maintain the watershed — for their good and the good of others.*

**September 2009** | When Gabon's late president Omar Bongo created 13 national parks covering 10% of the country's territory in 2002, he turned Gabon into a conservation champion overnight. Gabon has surprised critics who dismissed the move as a publicity stunt by following through with a comprehensive legal framework and an ongoing search for long-term, sustainable environmental protection.

The country is already using carbon finance to preserve its forests by earning credits for reducing emissions from deforestation and degradation (REDD) under the Kyoto Protocol's Clean Development Mechanism (CDM), and has recently become a pioneer in the use of other Payments for Ecosystem Services (PES). The idea of taking into account the non-market value of ecosystem and to charge for the services they provide (anything from carbon sequestration to flood control to crop pollination) could provide new incentives for conservation.

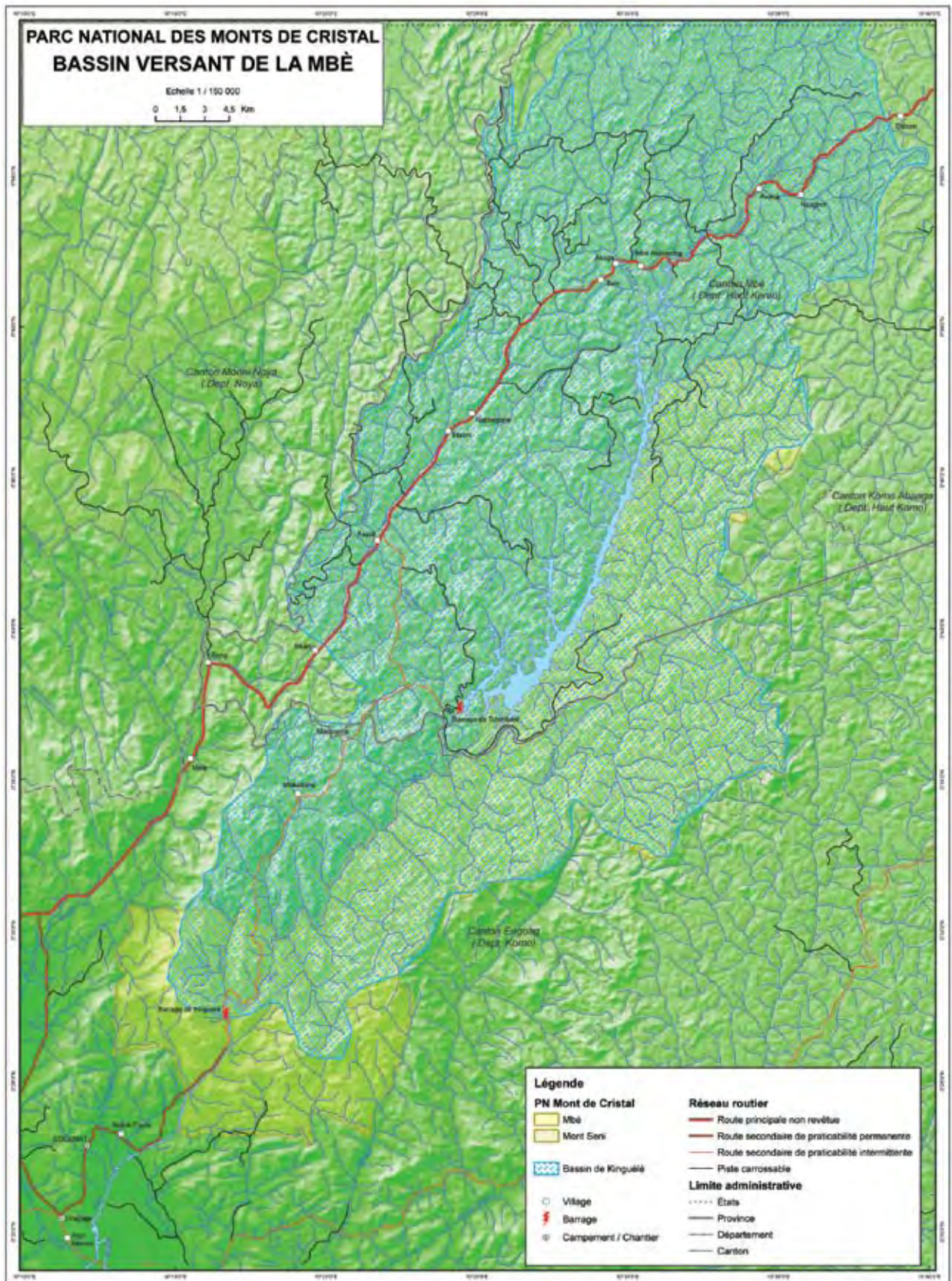
The Ministry of Environment has teamed up with the Wildlife Conservation Society (WCS) on a Payment for Watershed Services scheme designed to preserve and revive the Mbé watershed in the northeast of the country.

### Now is the Time

"The awareness and capacity for PES in Gabon is low," says WCS Gabon technical advisor Christina Connolly, "but there is a keen interest in the project because it fits into the sustainable development concept."

The timing is right. Gabon has enjoyed substantial — and sustained — oil revenues since the 1960s, but with production forecast to decrease in the medium term, the pressure is on to diversify the economy. Mining and logging have huge economic potential, but their impact on the environment could be disastrous.

Forests cover 85% of the country and are home to some of the highest levels of biodiversity in the world. The Mbé watershed is one of many gems in Gabon. A 2004 study by the Central African Regional Program for the



Environment (a USAID initiative) concluded that “in terms of numbers of species per hectare, it is the richest site in Africa assessed to date.” Endemicity is high, and the local ape population hasn't been affected by the Ebola virus.

The Mbé also plays a vital economic role: the watershed is the main source of electricity for Gabon's capital, Libreville, which makes up 60% of the country's population. Electricity is generated from a hydroelectric dam owned by the Société d'Énergie et d'Eau du Gabon (SEEG), a subsidiary of the French multinational Veolia. Forests in the watershed reduce siltation in the reservoirs and help regulate water flow.

### Threats to the Mbé

Despite its environmental and economic importance, the Mbé is facing serious threats. As well as illegal mining, logging and hunting, there is no capacity to regulate activities of the numerous legitimate actors: logging and mining concessions, the Monts de Cristal National Park (which occupies a third of the watershed) and local communities. The approach is piecemeal and fails to enforce legal requirements. The Forestry Code for instance requires concessionaires to adopt sound environmental practices, but none of the logging companies in the watershed abide by it. They're not FSC certified and don't use reduced impact logging techniques either.

WCS, with support from the GEF and USAID Translinks, is trying to establish a Payment for Watershed Services (PWS) scheme in the Mbé for services rendered to the city of Libreville. The basic principle is that electricity users downstream would pay land users upstream to adopt land-use practices conducive to the protection of the ecosystem and the good functioning of the hydroelectric dam. It's trailblazing work but Connolly hopes it will serve a greater purpose.

### Early Days and Institutional Challenges

“What we have done is accumulate knowledge that will help us design the next three years. We have to build the institutional and legal framework of the PES, and I am hoping that the principles and institutions we set up can accommodate other PES schemes and REDD activities,” she says.

Gabon's complex institutional make up is likely to be one of the biggest challenges in getting the PWS running. There are a dozen stakeholders involved — from several ministries to the Monts de Cristal National Park (which covers a third of the watershed area) to local authorities, mining and logging concessionaires and local communities — and as many conflicting priorities to reconcile.

The scheme also lacks a strong business case for the time being. Because of a chronic lack of data, it is difficult to show the link between deforestation and sedimentation; since it is the premise the Mbé scheme is based on, Connolly says studies to establish a connection will be put in place. “At the moment, it is hard for SEEG to know the extent of the change they would have a stake in addressing.”

### Defining the Services

The exact nature of the services rendered is equally hard to define. Local populations currently have a relatively low impact on land degradation, so what would they be paid to do or not to do? Equally tricky is the

notion that logging companies would somehow be paid to adopt environmentally-friendly practices when it is in fact a legal requirement they have failed to comply with.

Connolly acknowledges these are difficult questions but says that the PES scheme is an opportunity to rethink the current situation. Since the stick didn't work, perhaps the carrot will? The PWS could provide an incentive for logging companies to go above and beyond the current legal framework such as not cutting trees near rivers or on steep slopes, which create acute sedimentation problems. As for local communities, there is a move towards more community involvement, so there is scope.

Then there is the issue of payment. SEEG would be the main buyer, but it is likely it could pass on some or all of the cost to its customers.

"People are very supportive of the project in principle," says Connolly, "but when we start talking about passing the cost on to consumers, it may change."

Ensuring that the funds are then collected and distributed appropriately is another consideration: who would be in charge?

Etienne Massard Makaga, general director for the environment and nature protection at the Ministry of Environment, is more dogmatic.

"The PES is a new way of seeing things: we have to shift from thinking about the environment in an economic context to thinking about the economy in an environmental context. We're changing the paradigm. And this pilot project is about bringing the entire Gabonese society to change paradigm," he says.

He thinks that once people understand the mutual benefits of the system, they'll adhere to it.

"If SEEG realizes that the new approach is generating savings in operational costs, it will definitely take part. And if consumers get a better, more reliable electricity supply, a 2-3% increase on the bill will be money well spent."

## The Road Ahead

It is too early to have all the nitty-gritty details ironed out, but the scoping study has raised some interesting issues. WCS is submitting its plan for the next four years to the GEF (the main funder) this autumn; if all goes well, feasibility studies will start in January 2010. The objective is to have a signed contract between buyer(s) and seller(s) by the end of the program.

The feasibility study will focus on cost-benefit analysis and valuation studies to establish a robust PWS. Connolly and her team will also have much awareness-raising and capacity-building to do amongst stakeholders.

If the Mbé PWS materializes, WCS has planned interesting follow-up measures to evaluate the impact of the scheme: two sample areas will be compared, one taking part (treatment group) and one not involved (control group).



"It's not a new idea," says Connolly, "but it hasn't been implemented systematically in the past. With the benefit of hindsight from other projects, we thought it would be good to include at the design stage."

Funding or not, Connolly says WCS will pursue its work on PES in Gabon. The government also has high hopes for PWS schemes. The country plans to continue developing hydroelectric energy; large-scale PWS schemes could be part of the development, such as in the Grand Poubara dam in northeast Gabon, part of a €3 billion deal to exploit the Belinga iron mine.

# CDM in Africa: Facing the Hurdle of Conventional Finance

by Durando Ndongsok

*Climate change threatens the world as a whole — and Africa in particular, because increases in droughts and floods mean more on a continent where the population is already struggling to make ends meet. The continent therefore has more than most to gain from financing schemes that promote sustainable development and slow climate change — but will Africa be in a position to benefit from them?*

**16 September 2009** | The Kyoto Protocol's Clean Development Mechanism (CDM) offers an opportunity for projects in developing countries with the potential to reduce greenhouse gases compared to the baseline situation (i.e. business-as-usual situation ex ante to the project implementation) to secure extra revenues from Certified Emission Reductions (CERs; or commonly called carbon credits) which they receive in proportion to greenhouse gas emissions that they have reduced. Governments and companies in developed countries buy these credits, as they can use them as part of their greenhouse gas emissions reduction commitments under the Kyoto Protocol.

Since the Kyoto Protocol came into force, over 4,000 CDM projects have reached different stages of their CDM development, with around 1,800 already generating carbon credits. On average these projects reduce more than 300 million tons of greenhouse gases per year. With estimated prices of around €10 paid per carbon credit, a basic math calculation shows revenues of over €3 billion transferred annually to developing countries in support of these climate protection projects.

Africa, however, is trailing — we are tempted to say as usual — behind the rapidly growing market for project based carbon credits and is host to a meager 2% share of the global CDM pipeline. The main reason for this unfortunate situation lies in the difficulties associated with finding conventional project finance in Africa — and not so much in an often-debated lack of (CDM) capacity on the continent.

## Why is Africa Trailing?

According to World Bank estimates, Africa has the potential for more than 3,200 clean energy projects which could provide more than 170GW of additional power generation capacity and thereby reduce about 740 million tons of greenhouse gases per year. Even greater emission reductions can be gained in the agriculture and forestry sectors, or by gas flaring and waste management technologies.

Despite this great emission-reduction potential, African countries have so far failed to benefit much from the CDM. Currently, there are 33 CDM projects registered on the continent, which constitute only 2% of the global total. The lion's share of global projects are hosted by China (32%), followed by India (27%) and Brazil (10%).

South Africa leads the continent with 16 projects, followed by Egypt with five and Morocco with four.

These statistics show that CDM projects currently go first to those countries where the underlying project financing is easily available. Is project finance then the main hurdle hindering the success of CDM in Africa?

### Carbon Finance is no Panacea

Africa suffers no shortage of great project ideas that expect financing from the CDM, but project developers need to understand that carbon credit revenue itself accounts for just 20% of the underlying financing of CDM projects on average.

That means the project has to be somewhat viable financially before the carbon revenue tops it off.

Let's, for example, examine the conventional financial calculations for a biomass-to-energy project in Nigeria.

Let's assume the math gives you an internal rate of return (IRR) of 12%, which you then find isn't luring potential investors. So you investigate carbon finance, and that brings your IRR to 17%, and they bite.

This is the logic behind the CDM: that carbon finance can turn borderline projects into viable ones because their greenhouse gas reductions and subsequent carbon credits revenue make them worthwhile to investors. This also highlights the fact that the CDM is neither a panacea for projects that make no financial sense at all — nor an added bonus for projects that are profitable without carbon finance.

CDM finance is meant to tip the balance in favor of climate-protection projects that would just miss the profitability threshold without them — and therefore not be implemented.

### The Cost of CDM Registration

Project developers often balk at paying for CDM registration, but that cost is insignificant compared to the revenue that one can expect — especially when you consider that a project that is bankable and has reached financial closure is unlikely to face further hurdles.

In fact, it costs just €80,000 or so to bring a simple project under the CDM process to the point of registration by the CDM Executive Board, and complex projects like afforestation and reforestation top out at €120,000. When you consider that an average CDM project generates around 30,000 to 50,000 carbon credits per year for up to 21 years at a price of roughly €10 per carbon credit in mind, it's worth the cost.

But while costs related to the CDM process are low, it is unlikely that a conventional project would not require several million Euros to be implemented. A reasonable renewable energy project — for example, a biomass-to-energy project with just 5MW of installed capacity — will need an investment of at least €10 million, which will rise to €15 million and even more for solar photovoltaic. A composting plant that is taking only 500 tons of waste per day — an amount any small city in Africa is easily producing — will require at least €5 million to be implemented. The list of examples could be continued. If this financing is organized — complete with a feasibility study, a business plan, and financial closure — the CDM is unlikely to be a problem.

### The Need for Capacity Building?

As we saw above, Africa's meager slice of the global CDM pie is concentrated in three countries — South Africa, Egypt and Morocco — and all three are clearly emerging countries or even wealthy countries compared to the likes of Chad, Somalia or Rwanda. This fact supports the thesis that the CDM is growing in countries that have easy access to conventional financing.

We draw from here another seemingly straightforward conclusion: namely, that spending time and money on building capacity in Africa for the development of CDM projects is secondary. There is no question that the CDM development process is very complex, but its complexity is easily overcome if there is a bankable project that can be accepted as a CDM project.

### Plenty of Demand for African Projects

Our experience, especially in Africa, shows that there are many CDM project developers that will never go beyond the great ideas that they have. But we have never come across a bankable project with CDM potential that has not been developed as a CDM because of its complexity or the lack of a maximum of €120,000 to finance the CDM process.

In fact, as soon as there is any bankable project with CDM potential in Africa, all the players in the carbon market are literally fighting to contract the project. In many cases consultants, brokers and buyer of carbon credits even take up all the cost of CDM development when they contract in advance carbon credits that will be delivered in years to come.

International institutions and development organizations supporting capacity building for the CDM in Africa should instead concentrate their efforts on finding solutions to make conventional project financing work for Africa. Africa has an almost eternal problem with national and foreign direct investment. But we are sure if a potential CDM project can be financed, its CDM part can easily and successfully be developed.

### Here is the Money; Where are the Projects?

The appetite to invest in Africa is increasing — with funds, development agencies, banks and even private individuals willing to take comprehensive shares in CDM projects in Africa.

Although this is much appreciated, many of those interested investors are looking for bankable projects, i.e. projects with comprehensive feasibility study and business plans developed with at least a minimum equity financing already in place. Such projects are coming more and more from Africa, but the lion's share is still idling at development stage, with developers lacking money to take projects to a comprehensive stage. We believe there is a strong need for seed money in Africa.

Many development agencies — especially those spending a lot on supporting CDM capacity building — should perhaps think more in the direction of providing project developers with the seed money, which in most cases is far below €100,000. Investors will be more attracted when a comprehensive project is presented to them, not just a great idea with no basic studies done. More venture investment is needed for Africa to tap the huge CDM potential.

This emphasis on project finance may seem naïve. However, for us, while we are aware that many other African related barriers to the CDM exist, or at least are widely discussed, project finance is of prime importance to the success of CDM development in Africa. Of the other barriers, however, the prevalent risk perception of Africa by foreign investors is worthwhile considering.

### Isn't Africa too Risky for Investors?

CDM-specific discussion papers or forums and conferences present Africa's risk as perceived by international investors as a serious hurdle to the success of CDM in Africa.

It is clear that many outsiders still perceive Africa as a risky field for investment, even if this might be decreasing. In terms of the CDM, however, the CDM related revenues account at best for just about 20% of the overall revenue.

This means that 80% of the overall financial risks are related to the actual project itself.

In fact, we saw that in most cases the CDM is taking an insignificant share of the overall financial risk of any project. As mentioned earlier, the CDM development costs rarely go above €100,000, but on the other side, the revenue to be expected from the CDM ranges on average from €300,000 to €500,000 per year. This is based on the assumption of an average annual generation of between 30,000 and 50,000 carbon credits at a price of €10 each.

The pure CDM return for a project is, therefore, extremely attractive.

If we add to this the fact that the investment for the implementation of the physical project is always in the order of millions of Euros, we see that when a project can exist, the CDM part of it cannot fail to be tapped. Thus even if the risk perception that many investors have for Africa is true, there will be the CDM development, when there is a project implemented with a CDM potential.

### Redirecting the Debate

There are efforts at the international level to help Africa benefit from the CDM, a concept that proves to be one of the best sustainable development tools for the least advanced economies.

The ruling body of the CDM, for instance, is working hard to reshape the concept to make it more beneficial for African countries.

Concepts like Program of Activities (PoA) and Reducing Emissions from Deforestation and Degradation (REDD) are very advanced in their development and are being tested already in the market. The PoA is to make the typically small size of CDM projects in Africa more attractive by combining many small projects in different locations into one large project. The REDD concept (see "Carbon and Land Use: the Economies of Cocoa, Timber, and Agriculture") is to include avoided deforestation as a CDM activity. REDD will particularly benefit Africa where more than 70% of emissions are based on forestry and agricultural activities.

On a more political level, the European Union Emissions Trading Scheme (EU ETS) has clearly expressed its interest in accepting carbon credits from Africa beyond 2012, and this independently of what international negotiations about the future of the Kyoto Protocol post-2012 will lead to.

### Thinking Beyond Kyoto

On the market side, few organizations are committing themselves to purchasing carbon credits beyond 2012, when the Kyoto Protocol expires. The most important organization currently buying those carbon credits is the Post 2012 Carbon Credit Fund advised by First Climate. The Fund was established by five leading European public financing institutions, all with the highest credit ratings — the European Investment Bank (EIB), Caisse des Dépôts, Instituto de Crédito Oficial, KfW Bankengruppe and the Nordic Investment Bank — with the express intention of providing certainty to the carbon credit market beyond 2012.

Launched in March 2008 as the first of its kind, the Fund is in the process of investing €125 million in carbon credits generated in the period 2013–2020. Already the Fund has invested in a composting and landfill project in Lagos, Nigeria and continues to look for further opportunities in Africa.

All these efforts are very important now and for the future of CDM in Africa. But they will only be helpful if the conventional financing of projects is working for Africa. We strongly recommend that the debate be redirected to finding solutions for making conventional project finance work for Africa. The CDM is the icing on top of the cake. No matter how much icing there may be, it cannot be enjoyed if there is no cake to hold it.

*Durando Ndongsok is a Senior Project Manager at First Climate. He earned his MBA at the University of Freiberg, Germany, with a focus on resources and environmental management. He also holds a B.Sc. Mechanical Engineering from the University of Eindhoven, the Netherlands, and a B.Sc. in Chemistry from the University of Dschang, Cameroon. Please send your questions and comments to [Durando.ndongsok@firstclimate.com](mailto:Durando.ndongsok@firstclimate.com)*

*Please see our Reprint Guidelines for details on republishing our articles.*

THE KATOOMBA GROUP'S

# Ecosystem Marketplace

The Ecosystem Marketplace seeks to become the world's leading source of information on markets and payment schemes for ecosystem services (services such as water quality, carbon sequestration and biodiversity). We believe that by providing reliable information on prices, regulation, science, and other market-relevant factors, markets for ecosystem services will one day become a fundamental part of our economic system, helping give value to environmental services that, for too long, have been taken for granted. In providing useful market information, we hope not only to facilitate transactions (thereby lowering transaction costs), but also to catalyze new thinking, spur the development of new markets, and achieve effective and equitable nature conservation. The Ecosystem Marketplace is a project of Forest Trends. [www.ecosystemmarketplace.com](http://www.ecosystemmarketplace.com)



**F O R E S T  
T R E N D S**

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

## the katoomba group

The Katoomba Group seeks to address key challenges for developing markets for ecosystem services, from enabling legislation to establishment of new market institutions, to strategies of pricing and marketing, and performance monitoring. It seeks to achieve the goal through strategic partnerships for analysis, information-sharing, investment, market services and policy advocacy. The Katoomba Group includes over 180 experts and practitioners from around the world representing a unique range of experience in business finance, policy, research and advocacy. [www.katoombagroup.org](http://www.katoombagroup.org)