

Business for Social Responsibility

The New Markets for Environmental Services:  
**A Corporate Manager's Guide  
to Trading in Air, Climate, Water  
and Biodiversity Assets**

December 2007



## About BSR & This Resource Guide

Since 1992, Business for Social Responsibility (BSR) has been providing socially responsible business solutions to many of the world's leading corporations. Headquartered in San Francisco and with offices in Europe, China and Hong Kong, BSR is a nonprofit business association that serves its 250 member companies and other Global 1000 enterprises. Through advisory services, seminars and research, BSR works with corporations and concerned stakeholders of all types to create a more just and sustainable global economy. As a non-profit organization, BSR is uniquely positioned to promote cross-sector collaboration in ways that contribute to the advancement of corporate social responsibility and business success. For more information, visit [www.bsr.org](http://www.bsr.org).

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# Executive Summary

The natural environment provides society with essential services—such as clean air and reliable flows of clean water—which are increasingly being valued in financial terms. Environmental markets—some regulatory and others voluntary—are now trading credits as well as derivatives. Regulatory environmental markets are operating in Europe, the U.S., Australia and other countries around the world. Voluntary markets and business-to-business “payments for environmental services” (PES) deals are also underway, in both industrialized and developing countries. These markets and transactions are sending price signals about environmental values. The result is that businesses can place a financial value not only on environmental compliance, but also increasingly on voluntary actions.

There is, however, a bigger story here, one that can only be gleaned by stepping back to see the broader context.

An astonishing number of environmental trends are pointing downward, as was most extensively documented in the Millennium Ecosystem Assessment (MEA). Results from the 1,300 scientists and 95 countries involved in the study suggest that over 60% of the environmental services studied—including dynamics related to clean air and reliable water flows—are being degraded faster than they can recover.<sup>1</sup>

The response of many environmental advocates—in regulatory, scientific, and advocacy roles—has been to seek out new approaches to conservation and incentives for restoration. One such approach is the broad set of efforts under the umbrella term ‘market-based mechanisms.’ Regulatory, cap-and-trade environmental markets are a set of market-based tools. Voluntary markets are another. Business-to-business, or business-to-NGO, payment for environmental service deals represent yet another approach to investing in the environment and the services that it supplies.

This Resource Guide introduces corporate decision-makers to the broad suite of market-based mechanisms related to the environment, with a specific focus on formal markets. It is intended to assist corporate managers in assessing the potential risks and opportunities of engagement within these markets. It is *not* intended to compare various economic mechanisms related to environmental restoration and conservation (such as markets versus taxes), nor does it imply a preference for markets versus other economic incentives. Rather, this Resource Guide seeks to offer corporate manager’s with the background information needed to begin assessing the relevance, risks and opportunities associated with the growing domain of environmental markets.

# Overview

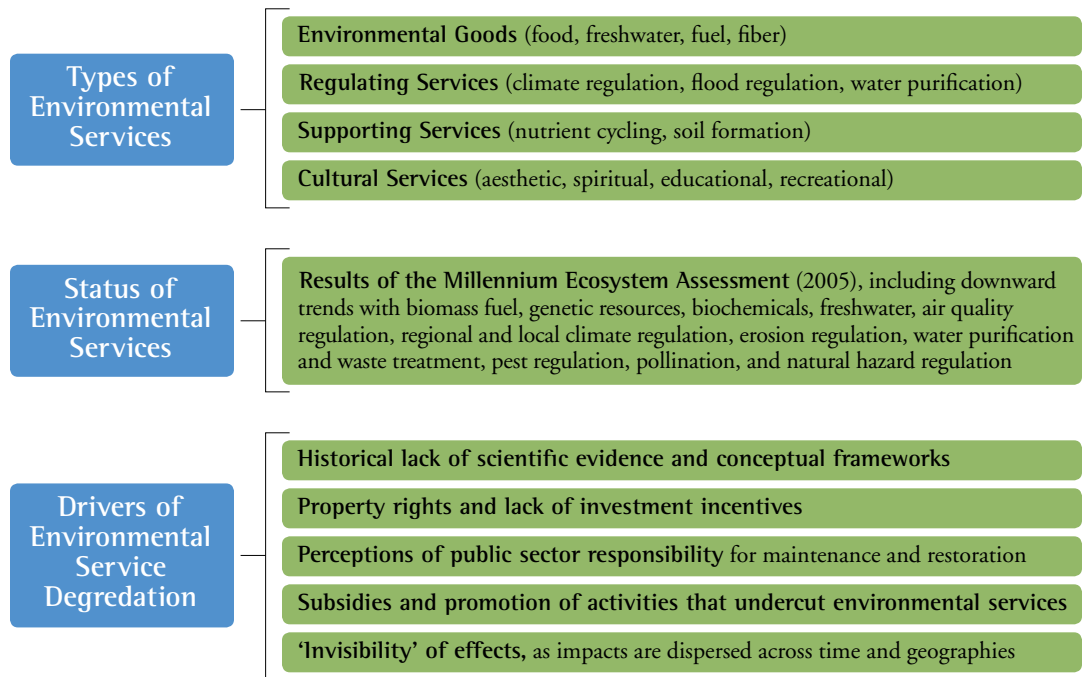
This Resource Guide offers an introduction to environmental services, markets, and business-to-business deals / “payments” related to environmental services. It has been written as a reference tool and is organized by tabs on key issues. This overview section offers graphic summaries of each tab, so that managers can quickly find the material that is most relevant to their interest in, and questions about, environmental markets.

# Undervaluing Environmental Services

Emerging markets and payments for environmental services stem from a simple insight. Businesses rely on well-functioning ecological systems for raw material inputs, water needs, energy sources, real estate value, and production process inputs.

Society has traditionally valued natural resources—such as food, water, timber, and fiber—but has, until recently, overlooked recognition of the services provided by natural systems. These environmental services range from regulation of the climate and disease, to treatment of water and waste.<sup>2</sup>

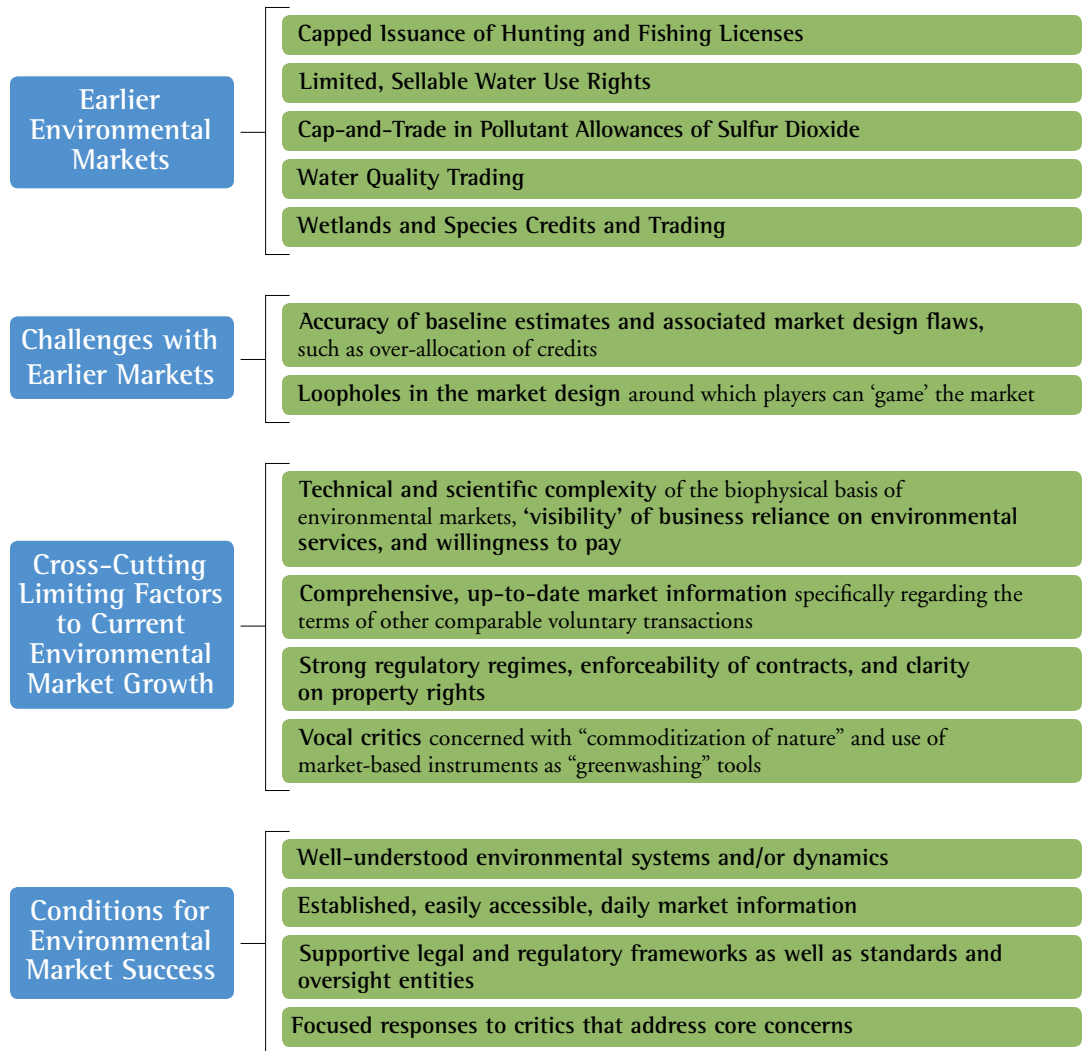
While these services are essential to the operating infrastructure of all businesses, they have seldom been recognized as such and are increasingly on downward trends, specifically related to water quality and soil fertility.<sup>3</sup> A growing body of research, including the Millennium Ecosystem Assessment, has documented multiple drivers that are contributing to these downward trends which are described in this section. In light of these trends, regulators, scientists, and advocates are increasingly seeking new approaches to conservation of ecological systems and environmental services. This tab lays out the background on environmental markets. It can be summarized as follows:



# Responding with Markets

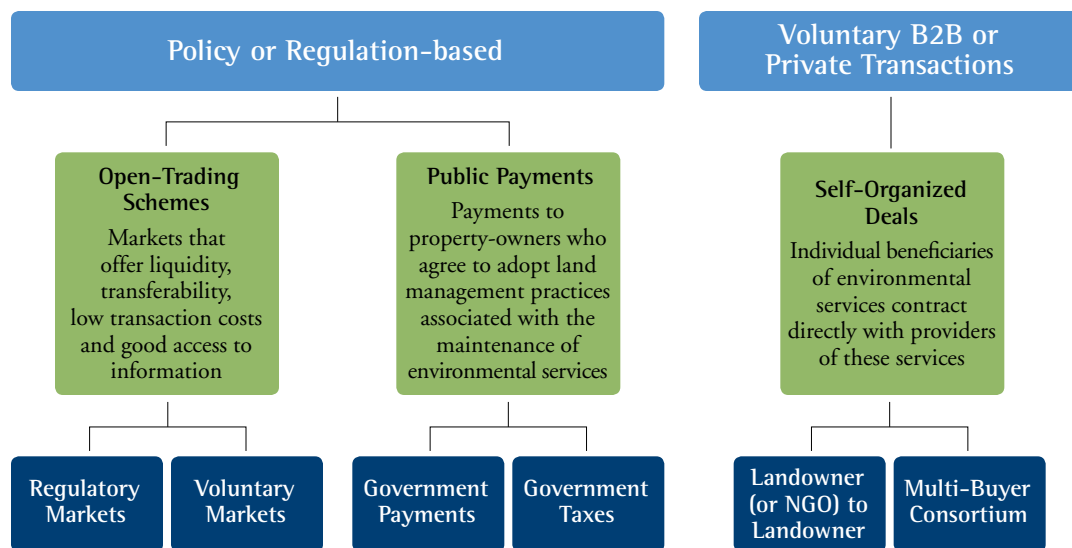
In response to current environmental trends, a growing body of markets and payments for environmental services are emerging around the world. Since the application of market-based mechanisms to environmental issues is not new, a brief review of its history offers insights about past experience.

Current limiting factors associated with today’s environmental markets are also examined in this tab and conditions for success highlighted. The following graphic summarizes the contents of this tab:



# Categorizing Environmental Markets

Today's environmental markets and payments can be grouped into two overall categories including: (1) policy or regulation-based markets, and (2) voluntary business-to-business (B2B) or private (payment for environmental service) transactions. These categories are broken down into sub-categories, as illustrated below, all of which are explained within this tab.



# Seeing a Snapshot of Today's Environmental Markets

A range of market drivers exist, both in terms of cross-cutting elements as well as more discrete components related to air, water, and biodiversity markets. Both of these types of drivers as well as market scale and size estimates are laid out in this tab. Key points made in this tab include:



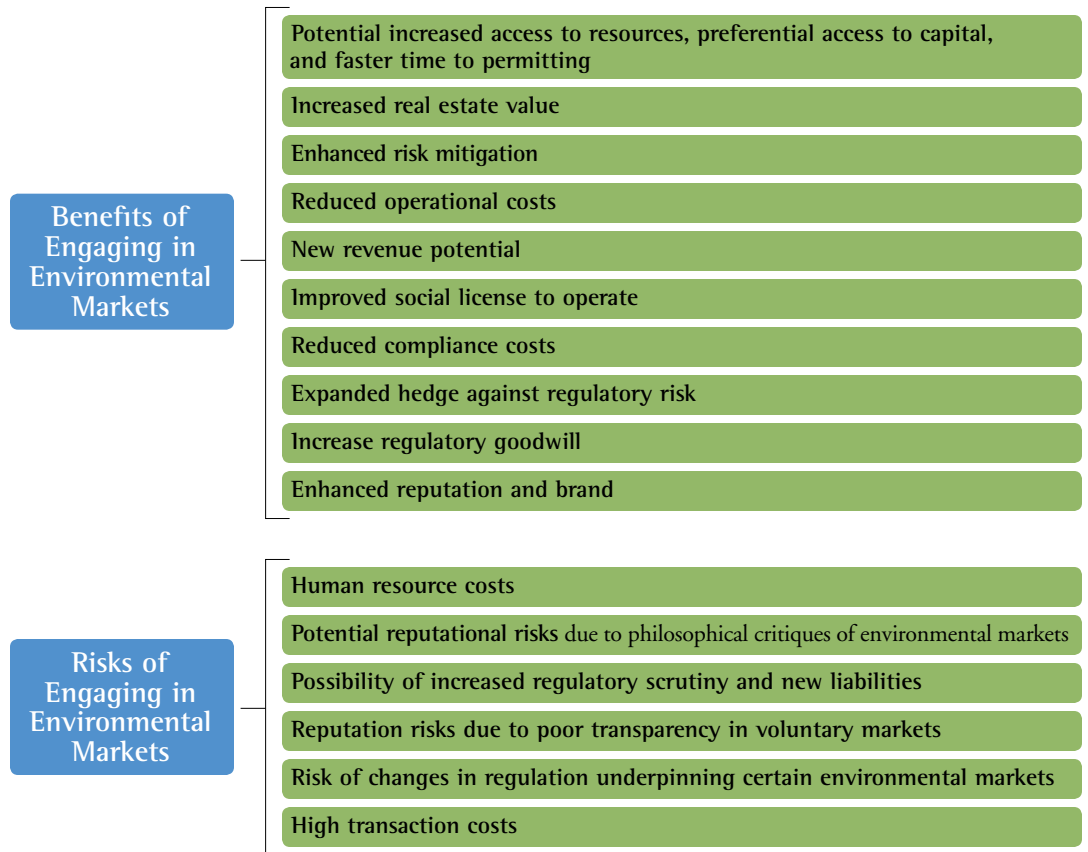
# Assessing Strategic & Operational Questions

The list of strategic and operational questions presented in this section enables corporate managers to begin assessing their company’s reliance on environmental services and potential interface points with environmental markets. The questions highlight key issue areas for consideration, potentially within the context of social and environmental impact assessments (SEIAs / EIAs) or other existing company processes.



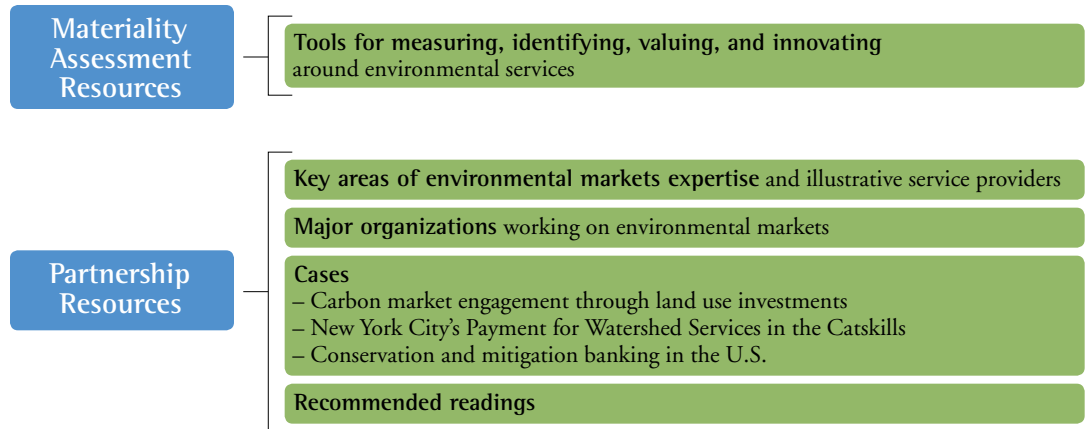
# Perceiving Risks & Opportunities

While business opportunities can be associated with engaging in environmental markets, there are also risks. Both opportunities and risks are visually laid out—in terms of strategic and operational benefits—along with brief examples. A summary of the potential benefits and risks is as follows:



# Resources

This final tab offers resources available for decision-making about environmental market involvement. It is organized around core areas of know-how including:



# Undervaluing Environmental Services

Environmental services are a core element of business infrastructure. So fundamental that they are often overlooked.

These services include protection of coastal areas and key infrastructure, such as harbors, the regulation of reliable and sufficient flows of water, the regeneration of productive soil, and carbon sequestration in plants and soil. Replacing these services is not always technically possible or financially feasible. (See Box 1 on valuing coral reefs and mangroves.)

In the past, environmental management emerged in response to regulatory drivers and stakeholder expectations related to particular issues—such as pollution and emissions. As both regulations and stakeholder expectations have become more complex, Environmental Impact Assessments (EIAs) evolved to assist corporate managers in methodically assessing potential environmental and social impacts of proposed projects.

As the scope of environmental concerns expands to include environmental services, it may be necessary to expand the scope of EIAs or companies may miss key risks. For individual companies, new questions include:

- Will current EIAs pick up potential impacts on environmental services?
- Does a particular company’s EIA consider the dynamics associated with the full range of environmental good and services (as laid out in table 1)?

The full range of environmental services includes:

**Table 1:**  
**Types of Environmental Services**

	Forests	Oceans	Cultivated/ Agricultural Lands
<b>Environmental Goods</b>	Food Fresh water Fuel Fiber	Food	Food Fuel Fiber
<b>Regulating Services</b>	Climate regulation Flood regulation Disease regulation Water purification	Climate regulation Disease regulation	Climate regulation Water purification
<b>Supporting Services</b>	Nutrient cycling Soil formation	Nutrient cycling Primary production	Nutrient cycling Soil formation
<b>Cultural Services</b>	Aesthetic Spiritual Educational Recreational	Aesthetic Spiritual Educational Educational	Aesthetic Educational

*Source: Millennium Ecosystem Assessment 2005, [www.millenniumassessment.org/](http://www.millenniumassessment.org/)*

Understanding whether EIAs include consideration of environmental services may become essential, as these issues are likely to be increasingly considered in decision-making—by regulators and even investors as well as insurers. The reason is simple.

Many environmental services are on downward trends.<sup>4</sup> Businesses are beginning to, and will increasingly, feel the effects of the undercutting of environmental services. Regulatory pressures, stakeholder concerns, and even direct operational challenges associated with unreliable flows of environmental service-related inputs into products and productions processes are all on the rise.

Types of  
Environmental  
Services

Status of  
Environmental  
Services

A growing body of research is highlighting drivers of many environmental services' downward trends, which include:

## 1. A historical lack of conceptual frameworks and scientific data

Naming a phenomenon is an essential prerequisite to addressing it. For decades, environmental services were understood and discussed in relatively small circles of ecologists—and rarely included policymakers or business people.

In 1997, a group of preeminent ecologists presented an estimate of the market value for the earth's environmental services—\$16-54 trillion with an average of \$33 trillion per year.<sup>5</sup> That same year, *Nature's Services: Societal Dependence on Natural Ecosystems*—edited by Gretchen Daily and featuring chapters by world-renowned scientists—argued for a shift away from traditional views of conservation and towards internalizing the value environmental services within our economies. Daily's second co-authored book, with Katherine Ellison in 2003—*The New Economy of Nature: The Quest to Make Conservation Profitable*—explored ways in which this theory might become reality, asking: “Why shouldn't people who deplete our natural assets have to pay, and those who protect them reap profits?”

Signaling the expansion of scientific work on environmental services is the rise in publications on the subject, most notably the 2005 Millennium Ecosystem Assessment, which included 1,300 scientists around the world. Its publication documented the erosion of environmental services as a result of human activity. Researchers have also continued to assess the economic value of environmental services. In 2005, for instance, the U.S. National Research Council published *Valuing Environmental Services: Toward Better Environmental Decision-Making*.

Today, scientific data and conceptual frameworks related to environmental services are proliferating and this historical stumbling block has begun to be addressed. The base of environmental service-related knowledge is growing and will continue to do so in the coming years.

## 2. Property rights and lack of investment incentives

Ecosystems, and the services they provide, often cut across property lines. This reality has meant that environmental services often lack discrete ownership and use rights. This legal context has been important given that society broadly relies on these services—not just companies. However, complicating this situation is that the basic prerequisites of well-functioning common property regimes—in which groups of landowners and resource users can overcome collective action challenges to invest in ecological systems, as laid out by Elinor Ostrom's 1990 book *Governing the Commons*—also are increasingly unique,

### Box 1

#### Valuing Environmental Services: The Case of Coral Reefs and Mangroves

Mangroves and coral reefs play a key role in protecting shorelines from damage and erosion. Scientists have found that one square kilometer of coral reef off the coast of Sri Lanka can prevent 2,000 cubic meters of erosion a year. These shoreline damage prevention and erosion control services mean that functioning mangroves are worth about \$100,000 per square kilometer in American Samoa, and up to \$3.5 million per square kilometer in Thailand, due to differential levels of coastal development.

In comparison, the annual costs of managing marine protected areas to protect mangroves are only about \$775 per square kilometer. “Replacement,” by building concrete “breakwaters,” can be far more expensive. For example, human-made “breakwaters” built around Male, in the Maldives, cost about \$10 million per kilometer.

Methodologies for conducting this kind of environmental service valuation are increasingly being developed. For example, another coral reef valuation methodology is being created by a partnership led by the World Resources Institute.

Source: United Nations Environment Program (UNEP). 2006. “In the Front Line: Shoreline Protection and other Ecosystem Services from Mangroves to Coral Reefs.” Nairobi, Kenya: UNEP; [www.ramsar.org/wri/w.n.inthefrontline.htm](http://www.ramsar.org/wri/w.n.inthefrontline.htm); [http://www.wri.org/biodiv/project\\_description2.cfm?pid=222](http://www.wri.org/biodiv/project_description2.cfm?pid=222)

particularly in landscapes where there are large absentee landowners or even corporate holdings. The net effect is that there are few clear incentives for investing in maintenance and restoration of environmental services, particularly in areas with strong commercial values.

Another dimension of the property rights issue relates to both case law and British Common Law which have long-standing requirements of ‘improvement’ as a key factor in determining ownership.<sup>6</sup> That is, undertaking ‘infrastructural’ work has historically been an element of asserting ownership. Such ‘improvements’ have, in many contexts, undercut environmental services by fundamentally changing ecological systems and altering habitat.

Environmental markets and payments for environmental services are premised on incentives for adopting practices that foster environmental services. By offering incentive-based approaches—through regulatory and voluntary markets, as well as voluntary business-to-business PES deals—the intention is present land owners as well as all resource users with attractive options that pay for, or at least subsidize, restoration and conservation.

### 3. Perceptions of public sector responsibility

The public sector has been commonly viewed as the primary protector of natural resources through policy, monitoring, and even large-scale ownership. This role was manifest, for example, in national wildlife laws around the world in which wild animals were, in some nations, deemed the property of government. Later, national parks and forest reserves were established and run by government agencies—further solidifying the perception that maintaining natural resources landed squarely in the domain of the public sector. Finally, the emergence of environmental regulation in countries around the world has furthered the idea that governments were the protector of natural resources, with non-governmental organizations (NGOs) acting as additional checks on the system. Together, all of these elements have created a sense that government is overseeing natural resources—with national economic development goals or conservation, protection and recreational objectives.

The terminology that developed around governments’ engagement with natural resource management commonly centers on ‘public goods,’ which has been another element factoring into non-engagement of the private sector. If the benefit is accrued by us all, then why should any entity other than the government invest? If it is common property, why should it not be the government taking action?

Today, advocates of environmental markets argue that since environmental services are produced across landscapes—on public and private lands alike—the geographic scope dictates a similarly broad scope of engagement in order to be successful in maintaining environmental services. Since ecological boundaries do not stop at political, administrative, or ownership boundaries, there is a need to ensure that consideration of environmental services crosses boundaries as well. In addition, ‘user pays’ principles are increasingly being held up as a rationale for individual users as well as the private sector—which relies on environmental services—to support their maintenance.

Another reason for moving beyond a focus on environmental investment from the public and nonprofit sectors is that they simply are not sufficient for the environmental service challenges documented by scientists. Additional investments and changes in practices are needed to turn-around current environmental service-related trends. Heading up the list of alternatives that are being explored are environmental markets and payments for environmental services.

### 4. Subsidies and promotion of activities that undercut environmental services

Some subsidies, policies and government-led programs have directly undercut environmental services. For example, scientists assert that subsidies have promoted the “over-use” of fertilizers and pesticides.<sup>7</sup>

By encouraging greater food production in industrial countries than global market conditions warrant, subsidies have also led to increasing pressures on environmental services. In addition, subsidies have supported dynamics that reduce the profitability of agriculture in developing countries, which has in turn led to the need for more production (and greater demands placed on environmental services) to make up for financial shortfalls.

These subsidies have been significant. For example, in the agricultural sectors of OECD countries between 2001 and 2003 the average was over \$324 billion annually, or one-third the global value of agricultural products in 2000.<sup>8</sup> Finally, scientists point to the additional challenge of inappropriate subsidies within many countries outside of the OECD, particularly related to water, fisheries, and forestry.<sup>9</sup>

The challenge now is that removal of perverse subsidies will both produce net benefits as well as costs, particularly for the poor in developing countries, which in turn could spark additional, unintended adverse impacts on environmental services. Anticipatory proactive strategies in addressing and mitigating these potential cascading effects and unintended consequences will be key to averting further environmental service-related impacts.

## 5. 'Invisibility' of effects, due to time lags and dispersal across geographies

Since some impacts on environmental services tend to occur over time and across geographic space, the effects may not be easily perceived. Even when they are noted, the complex set of causal links may be challenging. For example, pollution emitted in Ohio may appear to have little effect—unless you are tracking acid rain in New York and elsewhere on the East Coast of the United States. Similarly, wastewater released into a river may seem inconsequential unless studies are being done of oxygen levels further downstream or even where the river empties into the sea, potentially thousands of miles away. This dispersion of impacts across geographies and time makes it difficult to associate cause and effect as there may be several factors contributing to the impacts. Scientists, however, are increasingly able to tie together not just one action, but multiple factors with broader ecological dynamics underway.

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**The net effect of all of these issues has been that environmental services have fallen between the proverbial cracks. Emerging environmental markets and payments for environmental services seek to internalize environmental services within economies. Ideally, the benefit of these tools, then, is the maintenance of environmental services that are essential both to business and societal operating infrastructure.**

## Responding with Markets

### Earlier Environmental Markets

Addressing environmental issues through market-based mechanisms is not new. Water use rights, for example, have long been capped in the western U.S., driving an active trading market as a result. In addition, water quality trading has existed since the 1984 creation of a trading program in the Lake Dillon reservoir by the State of Colorado, due to state-imposed phosphorus regulation. Similarly, many regions limit and sell hunting and fishing licenses for everything from large game to ducks (though in many of these programs, the government, not the market, sets the price).

The basic idea is the same: a permit quota is set and permits are then sold, generating revenues that can be channelled into maintenance of the natural resource. Similarly, the concept of cap-and-trade approaches to efficiently addressing environmental issues have been put forward for decades, such as in a *Resources for the Future* paper issued in the 1950s.

Harnessing demand for a given environmental good or service in order to fund its conservation is the core idea behind markets and payments for environmental services. The concept is that if people pay for the services they use, conservation ought to be able to pay for itself in many areas. Markets have the potential to expand the number of people engaging in deals and therefore enable trades on a much larger scale than might otherwise be possible.

One of the most commonly cited examples of a formal cap-and-trade market in environmental services was established in the early 1990s with the U.S. Clean Air Act, which led to trading in pollutant allowances of sulfur dioxide, one of the gases responsible for acid rain. Under this Acid Rain Program, the largest utilities in the U.S. reduced their sulfur dioxide emissions more than 50% from 1980 levels. Trading generated a jump in reductions, and *Resources for the Future*, a nonprofit think tank, calculated that the market saved \$700-\$800 million per year when compared to a command-and-control approach.<sup>10</sup> In this market, government and market mechanisms worked together: the government maintained property rights and set clear limits on emissions, while the market determined the lowest price at which these limits could be achieved.<sup>11</sup> Signs of recovery were evident in previously acidified lakes and streams throughout the most heavily affected regions. In the language of environmental services, clean air and clean water were enhanced by creating a market and allocating emissions rights where neither formerly existed.

### Challenges with Earlier Markets

Challenges with this market have, however, existed. Assessments of the acid rain market over time have been mixed and there have been questions about market design. While this particular market was more efficient than the former command-and-control approach, sulfur dioxide emissions have stabilized since 1998, implying that the cap was not designed appropriately. Meanwhile New York State still suffers from acid rain since emissions are carried into the area from other states, such as Ohio. In addition, Ohio set a lower standard than New York, leading to areas in which there have been lower gains.

Similarly, the Regional Clean Air Incentives Market (RECLAIM) operating in southern California—to meet state and federal air quality standards in Los Angeles Basin—also established a cap and trade system focused on nitrogen oxide and sulfur dioxide. Emission reductions were made even while the economy grew. However, a U.S. EPA review offers a mixed review of the program overall, citing criticisms of over-allocations resulting in delayed emission reductions as well as oversight entities “over-managing

#### Box 2

#### Initial Design Flaws with the European Union’s Emissions Trading Scheme (EU ETS)

The EU ETS granted too many allocations initially. The result was that many companies did not have to buy any credits. Once the dynamics became clear, prices dropped significantly—from €15 (\$19) to €0.15 (\$0.21). In response to these early challenges, the EU ETS has set stricter carbon quotas and U.S. politicians are talking about auctioning carbon credits instead of giving them away.

*Source: Venkat, Emily Flynn. 2007. “The Carbon Folly.” Newsweek. (March 12), [www.msnbc.msn.com/id/17435875/site/newsweek/](http://www.msnbc.msn.com/id/17435875/site/newsweek/); The Economist. (2007) “Lightly Carbonated.” (August 2), [www.economist.com/displaystory.cfm?story\\_id=9587705](http://www.economist.com/displaystory.cfm?story_id=9587705)*

the market and perpetuating complexity and uncertainty” due to seventeen amendments made to RECLAIM since 1994.<sup>12</sup>

Both of these examples show that environmental markets are—not surprisingly—only as good as their design and management. If the baseline numbers and technical estimates underpinning credit allocations are incorrect, the market will not be effective or achieve its intended goals on desired timescales. In addition, if incentives to decrease emissions are inefficiently structured, then the result will be sub-optimal from an expenditure stance.<sup>13</sup> (See Box 2 on early design issues associated with the European Union’s Emissions Trading Scheme.)

Designing markets is a challenging process and has the potential to result in unintended consequences, particularly if: (1) the system dynamics are not well understood, and (2) there are loopholes in the market design, allowing players to ‘game’ the markets. The challenge is to design environmental markets that factor in complexities without over-complicating the market.

Cross-Cutting  
Limiting Factors  
to Current  
Environmental  
Market Growth

### Limiting Factors to Current Market Growth & Expansion

Many of today’s environmental markets particularly to voluntary ones are experiencing the usual ‘growing pains’ of nascent markets, including:

- price volatility;
- high transaction costs;
- verification challenges;
- difficulty in gaining real-time transaction information and emissions data, and
- a lack of insurance mechanisms.

However, environmental markets also have a number of unique obstacles, which—in order of priority—include:

#### A. Technical / Scientific Complexity, ‘Visibility’ of Environmental Services, and Willingness to Pay

While the general understanding of environmental services has greatly increased in the past decade, the biophysical dynamics of many services (such as carbon sequestration and hydrological regulation) are still being studied in many areas. These scientific complexities can mask the relationship between a company’s practices and the resulting provision of, or impact on, environmental services in a given area. The result is that it is often hard to see both the reliance and impact of companies on well-functioning environmental systems. In addition, the fact that environmental services often constitute a public good—enjoyed by many users—has led to a perception that they should be free or at least government-funded.

The response of environmental advocates is that as environmental services continue along downward trends, it is becoming important to instill a ‘user pays’ concept for both industrial users as well as, in some cases, the general public. Such an approach would channel investment into restoration and maintenance of the key operating infrastructure that environmental systems provide.

#### B. Comprehensive, Up-to-Date Information and Standards

The flow of information is different for regulated and voluntary markets. In regulated markets, information disclosure can be required by law, politics permitting, or offered by brokers or independent information providers. The level of detail is the key question. In voluntary markets, information disclosure can be demanded by market players; provoked through scrutiny in the press, or offered by brokers or independent information providers.

For example, in voluntary carbon markets, carbon offset providers are under increasing pressure to disclose more comprehensive information about the origins of the credits they are selling (e.g. do the credits come from tree-planting projects in Brazil or capturing methane in European landfills?). This pressure has led to various efforts to instill greater credibility in the market through standards (see Table 2 below) as well as efforts to rank the quality of different providers (for example see Clean Air, Cool Planet’s “A Consumer’s Guide to Retail Carbon Offset Providers”<sup>14</sup>).

**Table 2:**  
**Major Verification Standards for the Voluntary Carbon Offset Market**

	Gold Standard	The Voluntary Carbon Standard	Climate Neutral Network	Green-e	Climate Community, Biodiversity Standard	CCX	ISO 14064
Environmental and Social Co-Benefits	■		■		■		
Requires Monitoring	■	■	■	■	■	■	■
Reporting/Registration	■	■		■		■	■
Uses GHG Protocol		■	■			■	■
Certification Outside U.S.	■	■	■	■	■	■	■
Compatible with Other Standards	■	■	■	■	■	■	■
Sequestration Projects		■	■		■	■	■
Off-Grid Renewables	■	■	■			■	■
Energy Efficiency	■	■	■			■	■
Methane	■	■	■			■	■
Renewable Energy Credits			■	■			■

Source: *The Ecosystem Marketplace and Business for Social Responsibility*, 2006. “Offsetting Emissions: A Business Brief on the Voluntary Carbon Market.” [www.bsr.org/meta/BSR\\_Voluntary-Carbon-Offsets.pdf](http://www.bsr.org/meta/BSR_Voluntary-Carbon-Offsets.pdf)

As markets mature and standards, brokers, aggregators and information sources increasingly emerge, the costs of gathering information and conducting due diligence should drop. For example, in carbon markets, the number of carbon project developers and carbon offset retailers has continued to grow. In addition, aggregators are increasingly emerging to serve as the administrative representative, on behalf of offset project owners, of multiple offset-generating projects. Information sources are being developed by a whole host of players, from non-profit entities like the Ecosystem Marketplace’s e-newsletters on carbon, water, and mitigation banking<sup>15</sup> to for-profit market watchers like Reuters’ InterActive Carbon Market Community,<sup>16</sup> New Energy Finance’s briefings and focus reports,<sup>17</sup> and Point Carbon’s *Emissions Daily*.<sup>18</sup> Efforts are also underway to address transaction costs associated with environmental markets. For example, in the U.S., Mark Rey, Under Secretary for Natural Resources and the Environment at the Department of Agriculture, has proposed creation of national environmental market standards, which would be crafted by a board that also oversees quantification and pricing of credits.<sup>19</sup>

The landscape of standards, brokers, aggregators, and information sources will continue to change dramatically in most environmental markets over the coming years as these markets develop. Already, though, new players have emerged to provide risk mitigation through new insurance offerings and financial products in the carbon market. This kind of innovation should spread to other environmental markets in the next decade.

### **C. Strong Regulatory Regimes, Enforceability of Contracts & Clarity on Property Rights**

Just as the availability and transparency of information is important to a well-functioning market, so too are clear and enforceable contracts and property rights.

This factor should not, however, rule out developing countries as participants in environmental markets and business-to-business deals related to environmental services. Instead, there is an opportunity to explore various market-based mechanisms in a context that does not have complicating regulation.

To assist market entrants, environmental market intermediaries are emerging, with the goal of decreasing transaction costs and diminishing risk. For example, in Costa Rica, the government has established an oversight agency that negotiates agreements with private sector players and those who own or use the land. The government also oversees the execution of negotiated agreements, including the transfer of funds. (See Box 8 on Costa Rican Payments for Watershed Services.)

### **D. Vocal Critics**

Critics of environmental markets have presented two main concerns:

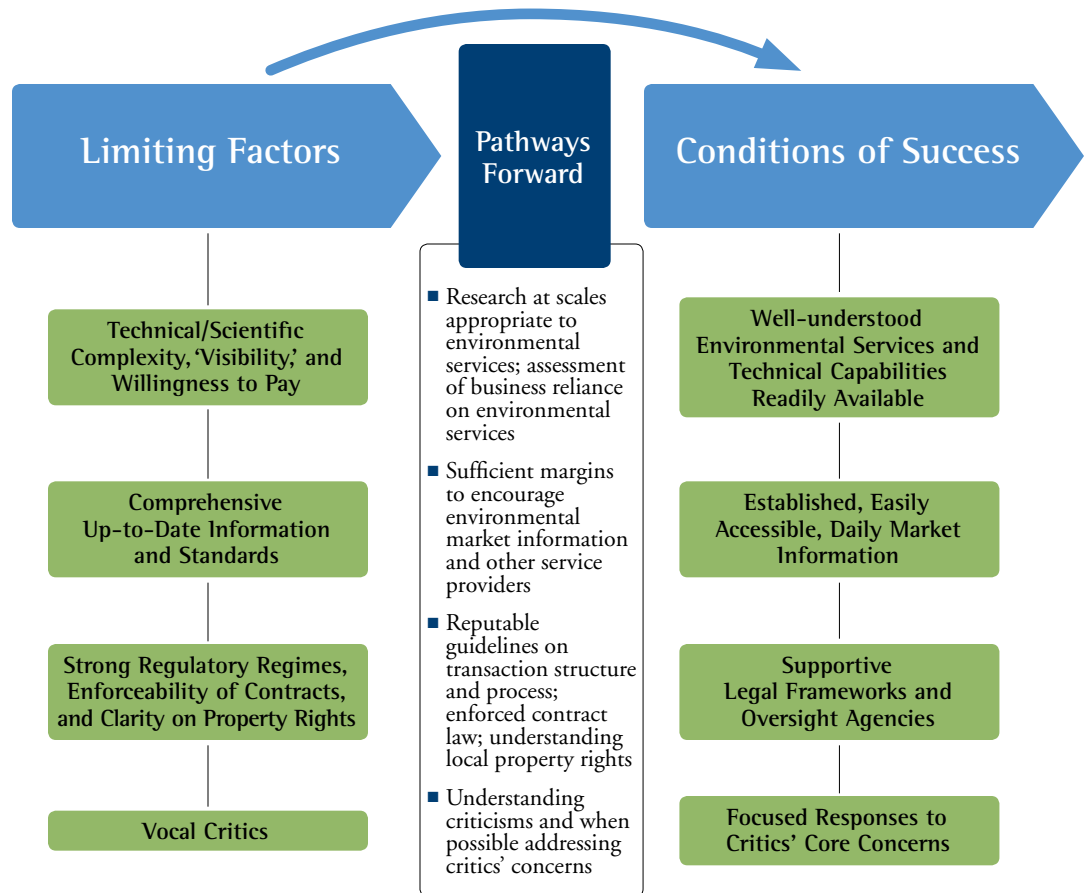
**1. Commoditization and privatization of nature.** For example, signatories to the Durban Declaration of Climate Justice argue that carbon markets effectively privatize the Earth's carbon cycling capacity.<sup>20</sup> Critics also express concerns that commoditizing nature will lead to the privatization of natural resources in ways that exclude the poor. Specifically, some NGOs have critiqued carbon trading as both ineffective for addressing climate change drivers, and adversely affecting poor people's access to land, as people are effectively pushed off lands to establish plantations for carbon sequestration purposes.<sup>21</sup> There are also concerns around access to water among the poor, particularly in developing countries.

Commoditization-based critiques of environmental markets are unlikely to disappear anytime soon and are, therefore, worth understanding and being able to respond to if a company decides to engage. One response is for a shift toward an approach of "compensation for environmental services," which hinge on ensuring that agreements are mutually beneficial.<sup>22</sup>

**2. 'Absolution' of polluters' responsibilities, through relatively small-scale infusions of cash.** Critics have likened corporate engagement in some offset transactions to putting "lipstick on a pig."<sup>23</sup> (See Box 3 on carbon offset critics.) Specifically, critics argue that offsets do little to drive the internal business process innovations and systems-level changes that are necessary to reduce emissions by the 50% to 80% by 2050, as recommended by the Intergovernmental Panel on Climate Change.<sup>24</sup> Moreover, some say, offsets may lead to complacency or "absolve climate guilt," while forestalling the necessary commitments to new behaviors, policies and business practices.<sup>25</sup> Instead, a 'hierarchy' of action is suggested that begins with reductions in impacts (such as energy usage), then turns to adoption of more sustainable inputs (such as renewable sources of energy), and only after these two items have been fully utilized should offsets be explored.<sup>26</sup> For corporate managers, the key is to understand the concerns of critics and have responses to these issues when any offset program is developed and rolled out publicly, including those that have transactions in environmental markets.

In light of these limiting factors, key conditions of success for environmental markets include:<sup>27</sup>

**Figure 1:**  
Translating Limiting Factors into Conditions of Success



Box 3

**Carbon Offsets Critics**

While there have been supporters of BP’s move to encourage motorists to pay £20 a year to offset their driving emissions, the scheme was also criticized by some environmentalists on the grounds that it would lead motorists to salve their consciences instead of taking steps to cut emissions from driving, such as buying a smaller car. For example, Robin Oakley of Greenpeace states that “so-called offsetting is better than doing nothing but only just. It’s like smoking 20 cigarettes then going for a run to feel less guilty. As long as British vehicles are pumping tens of millions of tons of CO<sub>2</sub> into the atmosphere every year, no amount of investment in clean energy projects built thousands of miles away will reduce the effect that our emissions are having on the climate.”

For companies engaging in various environmental markets and payments for environmental services, the opportunity is to explore new stakeholder engagement approaches and innovation opportunities within the criticisms being leveled.

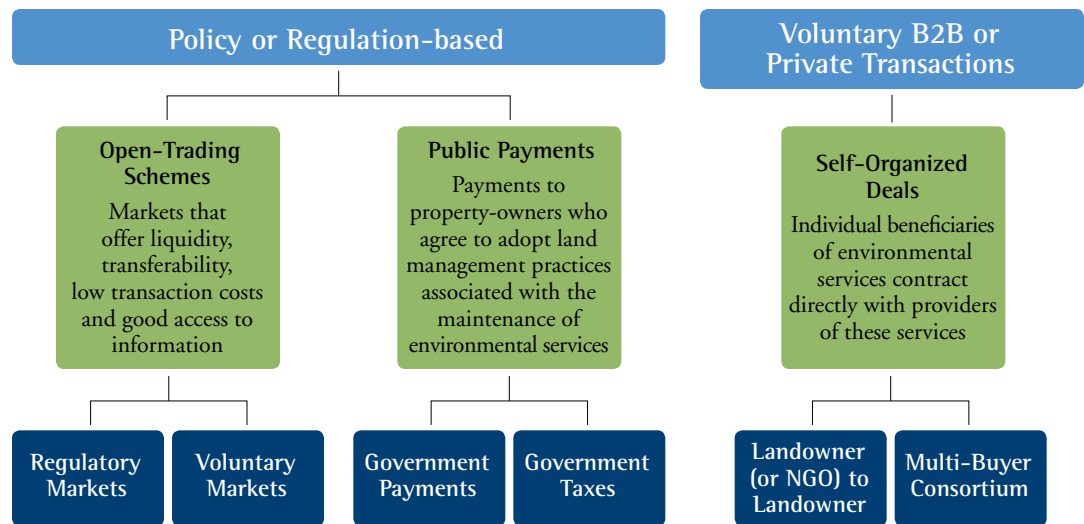
*Source: Harvey, F., “BP Wants £20 from Motorists to Make Amends for CO<sub>2</sub> Emissions,” The Financial Times, August 23, 2006*

# Categorizing Environmental Markets

Policy or Regulation-Based Markets

Current environmental markets and payment for ecosystem service-type business-to-business deals can be grouped into two overall categories, as illustrated in the figure below, each of which is discussed below.

**Figure 2:**  
Categories of Environmental Markets and Payments for Environmental Services



## Policy or Regulation-Based Markets

**A. Open-Trading Schemes** require the usual necessities of functional markets, including sufficient liquidity and transferability, low transaction costs and good access to information. There are two kinds of open-trading schemes, often distinguished in shorthand as “voluntary” and “regulatory” markets.

### 1. Voluntary Markets

Voluntary markets are often driven by philanthropic or public relations motivations, but can benefit companies by identifying inefficiencies, reaping first mover advantage and anticipating regulation. Voluntary transactions often have lower management costs, thus making credits cheaper to produce. However, voluntary transactions and credits may be harder to guarantee, since the projects that produce them have less quality assurance and no standard procedures. In addition, high transaction costs may exist due to a lack of free-flowing information.

Box 4

### Chicago Climate Exchange (CCX)

CCX is a voluntary greenhouse gas emission reduction and trading pilot program for emission sources and offset projects in the United States, Canada and Mexico. CCX is a self-regulated exchange designed and governed by corporate, university, trade association and NGO members who have made a voluntary commitment to reduce their emissions of greenhouse gases by 6% below the average of their 1998-2001 baseline by the year 2010.

*Source: Chicago Climate Exchange (2007)*

As these voluntary markets mature, it is anticipated that the number of market players will grow and that transaction costs will drop. The speed with which these markets mature depends on demand.

Numerous companies are engaging in voluntary transactions markets. (For example, see Box 4 on the Chicago Climate Exchange.)

### 2. Regulatory Markets

Regulatory markets are spurred by legal requirements that often take the form of a cap on environmental degradation. For example, the most stringent cap can be zero degradation, such as mandated in the U.S. under the Endangered Species Act. Other regulatory environmental markets include the U.S.' water pollutant control (see box 5), wetlands mitigation banking and conservation banking (which both seek to protect particular habitat), as well as the greenhouse gas-focused European Union Emissions Trading Scheme and the Kyoto Protocol.

Relative to voluntary markets, management systems to support compliance with regulation-driven markets benefit from regulatory certainty, which can be an enormous help in long-term planning. In addition, when viewed in terms of more prescriptive regulations—such as those that dictate certain technological parameters—market-based policy mechanisms are thought to lead to cheaper regulatory compliance because of the flexibility they allow for companies to chart their own path towards compliance and the rewards built in for voluntary performance.

**B. Public Payments** have been created to encourage natural resource management practices that maintain or enhance environmental services, through government payments and government tax programs.

### 1. Government Payments

The most widespread form of direct environmental service payments are from government to property owners who agree to adopt particular land management practices associated with the production of environmental services. For example, the Conservation Reserve Program in the U.S. pays an average of \$1.4 billion to farmers each year to convert erosion prone cropland or other environmentally sensitive acreage to perennial vegetative cover, such as native grasses, trees, filter strips or riparian buffers.<sup>28</sup>

### 2. Government Tax Programs

Government tax mechanisms are another common approach to providing incentives for the conservation of environmental services. For example, placing a conservation easement on property—which can entail restoration activities coupled with giving up the right to develop a piece of property in a certain way—can lead to income tax credits and property tax reduction.

#### Box 5

### U.S. EPA Water Pollutant Control

The U.S. Environmental Protection Agency requires most states to develop water pollutant control strategies, known as Total Maximum Daily Loads, which determine the maximum amount of a particular pollutant that a water body may receive and still meet required pollutant limits. Pollutant trading programs have developed as a way to minimize the cost of achieving water quality goals. Central bodies that act as pollutant banks or exchanges may be established anywhere in the U.S., but their service area is based on individual watersheds. Currently, municipal and industrial dischargers are the primary traders, and many look to farms and animal feed operations for low cost pollution reduction credits.

*Source: U.S. Department of Agriculture (2003)*

#### Box 6

### Future Growth of Government Payments for Environmental Services

It is likely that government payment-based incentives will only grow in the future. For example, in the U.S., the proposed 2007 USDA Farm Bill suggested “a series of far-reaching proposals that would introduce market-based auction mechanisms and local bidding pools to allocate conservation funds based on cost per environmental benefit...” In addition, the proposed bill is intended to “create stronger incentives for private markets in ecosystem services, such as increased wildlife and wetland habitat, water-filtration, and carbon sequestration.” Similar, government-funded environmental service related programs have been applied in, among others, Australia and China.

*Source: Hawn, Amanda and Ricardo Bayon. 2007. “USDA Farm Bill Proposal Takes Bullish Approach to Market-Based Conservation,” [ecosystemmarketplace.com/pages/article.news.php?component](http://ecosystemmarketplace.com/pages/article.news.php?component)*

**C. Private Transactions** are also underway, where individual beneficiaries of environmental services contract directly with landowners, land users, or other parties who can ensure ongoing provision of those services. These transactions are self-organized deals focused on maintenance of environmental services either (i) between individual landowners and/or NGOs, or (ii) within the context of multi-buyer consortia often operating with an aggregator of multiple sellers. These private transactions most commonly emerge in areas where there is no formal market for a particular environmental service, but one (or several) parties has an interest in maintaining that environmental service. Ideally, there is a clear way in which a specific environmental service objective can be realized by providing payments for another party (or group of people) to change their land management practices in ways that will foster the maintenance and conservation of particular environmental services.

### 1. Landowner (or NGO)-to-Landowner

Transactions between two or more private actors (such as companies or NGOs) are likely to increase as environmental services degrade, grow scarce, or begin to impact the supply chains of companies. These agreements provide benefits to all parties without the need for any more formal structure than contract law. These transactions can include open space acquisition as well as philanthropic conservation programs focused on the protection or restoration of environmental services. For example, The Nature Conservancy has purchased the development rights to private lands in order to protect certain environmental services, such as key habitats related to maintaining biodiversity.

### 2. Multi-Buyer Consortia

Similar to transactions between landowners and companies, there are also examples of multiple players collaborating on deals around environmental services. For example, the Costa Rican hydroelectric company, Energia Georgia, worked with the Government of Costa Rica and a local NGO to address sedimentation and improve water flows through upstream land use changes. (See Box 7 on Energia Georgia.)

#### Box 7

### Hydroelectric Company Payments for Watershed Services

Energia Georgia, a Costa Rican hydroelectric company, has engaged in a deal focused on decreasing sedimentation in order to improve regularity of water flows on which the company relies for generating electricity. The company pays \$18/hectare to the National Forest Office and National Fund for Forest Financing (FONAFIFO) and the national fund adds \$30/hectare—from sources such as fuel tax revenues—to put together \$48/hectare payments for watershed services' offer to landowners. A local NGO is then paid, which in turn pays land owners in the watershed who agree to engage in land management activities, such as conservation, to ensure the provision of environmental services. The local NGO oversees the conservation activities, enrolls landowners, and provides technical assistance.

*Source: Scherr, Sara, Andy White, and Arvind Khare with contributions from Mira Inbar and Augusta Molar. 2004. "For Services Rendered: The Current Status and Future Potential of Markets for the Environmental services Provided by Tropical Forests." Yokohama, Japan: International Tropical Timber Organization (pages 30-31).*

## Seeing a Snapshot of Today's Environmental Markets

### General Drivers of Today's Environmental Markets

Markets for environmental services are being created around:

- air emissions,
- water quality and quantity, and
- habitat and biodiversity protection.

Each market has its own unique context, though there are also common drivers, which include:

#### A. Declining or Altering Environmental Service Functions

Current activities in many areas, if unabated, may fundamentally alter the structure and function of many ecosystems, resulting in changes in the environmental services produced. Examples include productive fisheries transitioning to 'dead zones,' forested hillsides becoming mudslide-prone slopes, and the ranges of disease-bearing insects shifting to northern climates. In many areas, the trends are toward fewer fish, lower quality water, and longer dry spells punctuated by flooding. Overall, the current supply of goods and services may become more unpredictable as ecosystems continue to be altered. Market-based mechanisms are seen as one approach that could contribute to positively shifting current trends.

#### B. Rising Demand for Well-Functioning Environmental Services

Demand for environmental services is on the rise, even as current use patterns are—according to the Millennium Ecosystem Assessment—already unsustainable. These dynamics are perhaps most evident in demand for water, based on estimates that global demand for clean water will double, if not triple, in the next 50 years.<sup>29</sup> Today, we already see unsustainable rates of water consumption—in which between 5% and 20% of freshwater use exceeds long-term sustainable supply and is met by transporting water or mining groundwater at non-renewable rates. In addition, roughly 15% to 35% of irrigation withdrawal is estimated to be unsustainable.<sup>30</sup> Similarly, demand for other environmental services is on the rise. For example, as food demand increases, so too does the need for fertile soil, clean reliable flows of water, and robust fisheries. Market-based mechanisms have the potential to start sending clear financial signals about the costs of environmental service use, thereby both increasing efficiencies and driving investments into the maintenance of these services.

#### C. Increasing Conflict over Access and Demand for New Approaches to Addressing Issues

Numerous examples of environmental service-related competition and conflicts already exist. Access to water is a flashpoint for rural communities and one that may well grow for companies. In the Middle East, for example, conflicts over access to water exacerbate discord over territorial, political and religious issues. Companies could then find themselves in the uncomfortable position of competing directly with local citizens over clean water.

#### D. Growing Challenges to 'License to Operate'

Companies are already experiencing environmental service-based challenges to their 'license to operate', though they often tend to be misinterpreted as single environmental issues. (See Box on Coca-Cola in India.) These challenges signal a rise in scarcity of environmental services and will increasingly become corporate environmental strategy issues. Investors and insurers are spurring the shift as they adopt environmental policies and guidelines, often as a component of their own risk mitigation strategies.

The net effect is that stakeholder expectations are evolving and are likely to include a range of new dimensions in the coming years—one set of which will be attention to environmental services issues, especially related to climate and water. As the Coca Cola example demonstrates, businesses may increasingly be held responsible for maintaining (or at least not undercutting) the health and viability of key natural resources or ecological systems in their areas of operation. As a result, markets and business-to-business environmental service deals may become management tools for mitigating risk, addressing stakeholder expectations, communicating brand differentiation and contributing to the ability to maintain access to resources.

### E. Increasing recognition by the financial services sector

Leaders in financial services are increasingly recognizing the relevance of environmental issues to their business decisions, including environmental services. In response, a growing number of financial service companies are adopting guidelines to limit their own risks. For example, HSBC has guidelines on financing projects in critical natural habitats, such as the HSBC Freshwater Infrastructure Sector Guideline that seeks to “ensure that HSBC’s involvement in freshwater infrastructure projects is consistent with our long-standing commitment to sustainability.”<sup>31</sup> Goldman Sachs analysts have said that companies “with the best social and environmental track record, as measured by the GSEES Index, dominate the next generation of legacy assets.”<sup>32</sup>

### F. Expanding recognition of human health linkages

Scientists and health advocates are increasingly highlighting the linkages between environmental systems and human health.<sup>33</sup> This human health link was a factor in the early, air quality cap-and-trade environmental markets in the U.S. Similarly, today’s carbon markets, which are an effort to decrease climate change contributions, are at their base about retaining an atmospheric system that is supportive of human well-being and society. Therefore, whether the human health concerns are direct or indirect, it is increasingly likely that human health dimensions will be highlighted in communicating the importance of environmental protection in general and environmental services in particular.<sup>34</sup> Environmental markets offer a way to foster human health through maintaining robust ecological systems.

### G. Growing interest in potential economic efficiency and innovation sharing from market-based approaches

Finally, advocates of environmental markets highlight the potential for efficiency gains in meeting environmental objectives through use of market-based mechanisms. In addition, markets can enable innovation sharing and diffusion through broader exposure of new approaches that contribute to environmental objectives.

Box 8:

#### Access to Water & License to Operate: The Case of Coca Cola in India

The Coca-Cola bottling plant in Plachimada, in India’s Kerala province, was shut down in March 2004 when the village council refused to renew its water use license on the grounds that water was being over-extracted and threatened community access. After being shut-down for almost two years, Coca-Cola’s license was renewed in January 2006 for three months with the caveat that the company meet conditions, which effectively meant that it could not operate. That is, the conditions included no use of groundwater for industrial purposes or production of beverages.

This series of events is part of an ongoing challenge that the company has had in a region that suffers from pollution in natural aquifers and dropping water tables. Given the water pressures in other key regions—which are projected to compound with climate change—it is likely that Coca Cola’s challenges in India are a harbinger of things to come for other industries and regions in the coming years.

Sources: [www.indiaresource.org/news/2005/1040.html](http://www.indiaresource.org/news/2005/1040.html); [www.indiatogether.org/2006/jan/env-cokesaga.htm](http://www.indiatogether.org/2006/jan/env-cokesaga.htm); [fletcher.tufts.edu/news/2005/11/cocacola.shtml](http://fletcher.tufts.edu/news/2005/11/cocacola.shtml)

## Market Size and Scope

### Market Size and Scope

The size and scope of environmental markets has grown in recent years. For example, in 2006, carbon markets saw €22.5 billion in transactions.<sup>35</sup> Water-related markets and deals are generally limited in both geographic scope and trading volume, but exist in several countries. Finally, biodiversity-related markets exist in the form of U.S. conservation and mitigation banks and an adapted version of the same approach with Australia’s BioBanking.<sup>36</sup> In the U.S., transaction estimates on mitigation and conservation bank regulatory markets are roughly \$1 billion a year.<sup>37</sup> Finally, efforts to measure and value biodiversity is underway through biodiversity offsets. The current state of play of all of these markets is summarized in the following tables and graphs.

**Table 3:**  
**Scale of Environmental Markets & Payments for Environmental Services**

Commodity	Type Of Market	Name Of Market (Start Date)	Market Cap
Sulfur Dioxide Emissions	Regulatory (U.S.)	Regional Clean Air Incentives Market (1994)	\$600,000
Nitrous Oxide Emissions	Regulatory (U.S.)	Regional Clean Air Incentives Market (1994)	\$20,700,000
Wetlands	Regulatory (U.S.)	Wetland Mitigation Banking (1995)	\$289,659,866
Biodiversity	Voluntary (international)	Biodiversity Deals	\$331,257,678
	Voluntary (U.S.)	Western U.S. Land Conservation (for 12 states between 1998 - 2003) <sup>38</sup>	\$1,897,409,708 (\$316,234,954 average annual expenditure)
	Regulatory (U.S.)	Conservation Banking (2003)	\$40,773,590
	Voluntary, pilot for future regulation (Australia)	National Market-based Instruments Pilots Program (2003)	\$3,877,531
Water	Voluntary (Costa Rica)	Water-Based Environmental services Markets (1996)	\$8,944,943
	Voluntary (Mexico)	Payment for Hydrological Services (2003)	\$23,133,980
	Regulatory (U.S.)	Water Pollutant Trading and Offset (2003)	\$11,293,926
Mercury emissions	Regulatory (U.S.)	Clean Air Mercury Rule (2005)	Begins in 2010
Greenhouse Gas Emissions <sup>39</sup>	Regulatory (EU)	European Union Emissions Trading Scheme (2005)	\$24,357,000,000
	Regulatory (international)	Kyoto Protocol	\$5,477,000,000
	Regulatory (Australia)	New South Wales Greenhouse Gas Abatement Scheme	\$225,000,000
	Voluntary (national/linked to EU)	Chicago Climate Exchange (2000)	\$38,000,000
	Regulatory (U.S./New England)	Regional Greenhouse Gas Initiative	Begins in 2009
	Regulatory	California, Oregon, Washington	Pending

Sources: EU ETS, Ecosystem Marketplace, EPRI Solutions, NextGen, Point Carbon, RECLAIM, Sindicatum Carbon Capital, Trust for Public Land, and the World Bank.

**Table 4:  
Market Sizing<sup>A</sup>**

<b>Carbon</b>	
2006 <sup>B</sup> (US\$ per year)	Regulated markets: <b>\$30 billion</b> Voluntary markets: <b>\$100 million</b>
2010 <sup>C</sup> (projected US\$ per year)	<b>\$2 trillion</b>
<b>Water</b>	
2006 (US\$ per year)	Regulated Trading: <sup>D</sup> <b>\$7 million</b> Voluntary 'Payments for Watershed Services': <b>\$5 million</b> Government-Mediated Transactions: <b>\$1 billion<sup>E</sup></b>
2010 (projected, in US\$ per year)	Regulated Water Quality Trading: <b>\$ 500 million</b> Voluntary 'Payments for Watershed Services': <b>\$5 million</b>
<b>Biodiversity</b>	
2006 (US\$ per year)	Regulated Offsets: <sup>F</sup> <b>\$1.4 billion</b> Voluntary Offsets: <b>~ \$20 million</b> Government-Mediated Biodiversity PES: <sup>G</sup> <b>~ US\$ 3 billion</b>
2010 (projected, in US\$ per year)	Regulated Offsets: <b>~ \$2 billion</b> Voluntary Offsets: <b>~ \$25 million</b> Government-Mediated Biodiversity PES: <b>~ \$4 billion</b>

<sup>A</sup> Unless otherwise noted, the information in this table is from Ricardo Bayon and "The Ecosystem Marketplace Matrix," cited in *FAO and Forest Trends. 2007. "Investing in the future: an assessment of private sector demand for engaging in markets & payments for ecosystem services,"* by S. Waage, with contributions from I. Mulder, K. ten Kate, S. Scherr, J. P. Roberts, A. Hawn, K. Hamilton, R. Bayon and N. Carroll. Forthcoming in *(Payments for Environmental Services from Agricultural Landscapes) PESAL Papers Series. Rome, Italy, FAO and Washington, D.C., Forest Trends.*  
[147.202.71.177/~katoombal/documents/tools/FT-FAOPrivateSectorBuyersReport\\_14Mar07\\_.pdf](http://147.202.71.177/~katoombal/documents/tools/FT-FAOPrivateSectorBuyersReport_14Mar07_.pdf)

<sup>B</sup> Capoor, Karan and Philippe Ambrosi. 2007. "State and Trends of the Carbon Market." Washington, D.C.: The World Bank [carbonfinance.org/docs/Carbon\\_Trends\\_2007\\_-\\_FINAL\\_-\\_May\\_2.pdf](http://carbonfinance.org/docs/Carbon_Trends_2007_-_FINAL_-_May_2.pdf)

<sup>C</sup> UNEP FI. 2005. "The Working Capital Report." [www.unepfi.org/fileadmin/documents/WorkingCapital.pdf](http://www.unepfi.org/fileadmin/documents/WorkingCapital.pdf)

<sup>D</sup> Includes: Nutrient / Salinity Trading in Pennsylvania, Oregon, and Virginia, as well as Australia's New South Wales.

<sup>E</sup> Includes: New York City (-\$150 million), US' WRP (\$240 million), US' EQUIP (estimate 50% for water -\$500 million), Mexico Program (-\$18 million), Costa Rica Program (-\$ 5 million), China Program (-\$4 billion)

<sup>F</sup> Includes: US Compensatory Mitigation (permittee-responsible, banking, and in-lieu fees), Australian BioBanking, and EIA offsets in various developing countries.

<sup>G</sup> Includes: US Farm Bill conservation programs, Government of Mexico's biodiversity payments, Government of Colombia's biodiversity payments, and Australia's native vegetation program.

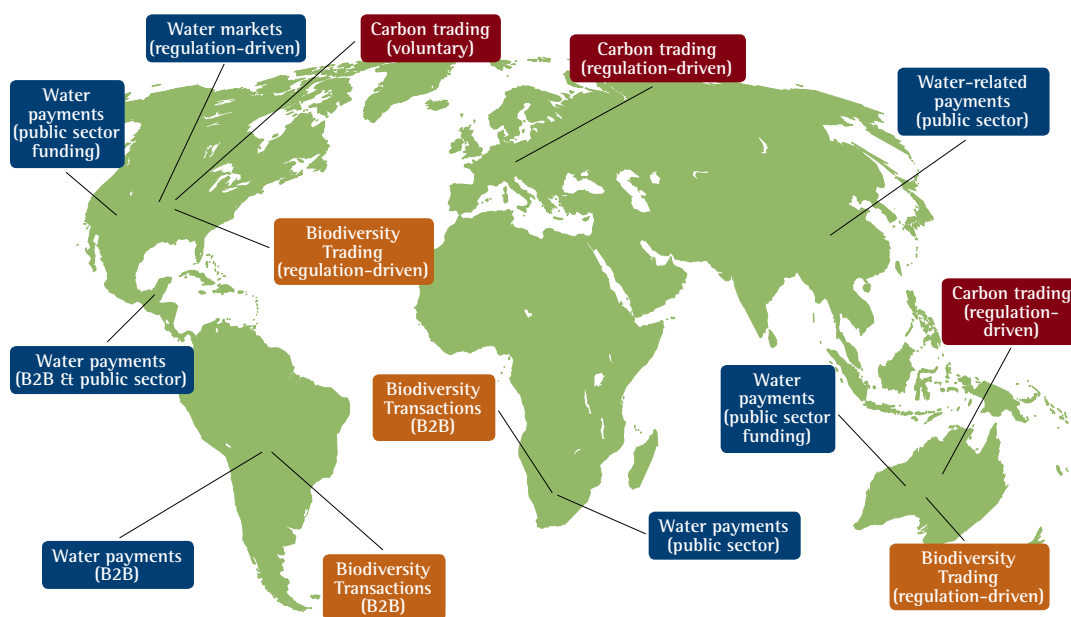
## Today's Environmental Markets

These markets are appearing around the world, as illustrated in Figure 3. Specifically, Europe leads in the carbon market domain. The U.S. and Australia are home to water-related market mechanisms. 'Payments for watershed services' are led by Latin America, such as through the Mexican government's payments for hydrological services.<sup>40</sup> Finally, the U.S. leads in biodiversity-related transactions, due to regulatory drivers associated with conservation and mitigation banking. China, Southeast Asia, and Africa are also home to some deals, NGO-supported projects, and public payment schemes.

## Air, Water and Biodiversity Market Snapshots

Each of the three environmental market domains are at different stages of development, and in addition to the common drivers described above, there are unique drivers which are summarized below.

**Figure 3:**  
Geographic Scope of Environmental Markets



## Drivers of Air Emissions Markets

### A. Air Emissions

Air-related markets have a history, perhaps most notably in the form of the sulfur dioxide markets in the U.S. Other air-related markets have since been formed, most notably including greenhouse gas / carbon markets which are currently the largest type of environmental market in the world. In 2005, the trading estimate was \$11 billion. In 2006, it was \$30 billion. In 2007, both regulated and voluntary carbon markets were estimated about almost \$1 trillion.<sup>41</sup> While sulfur dioxide markets emerged from an effort to optimize outcomes, carbon / greenhouse gas markets have a diverse array of drivers, including:

#### 1. Scientific consensus about the human contribution to climate change

The Intergovernmental Panel on Climate Change (IPCC) and Stern reports have been clear signals of the scientific consensus on climate change and the need for broad-scale action, most notably including policy action.

## 2. Clarity that a regulatory carbon-constrained future is likely

Regulatory responses to climate change have been gaining steam in key geographic regions around the world. For example, European Union Heads of State endorsed a climate change strategy that goes beyond 2012. In the U.S., policy discussions are underway both at state and national levels with an increasing number of proposals, many of which included cap-and-trade systems.<sup>42</sup> Regional action is also underway, such as in the northeastern states of the U.S., the Regional Greenhouse Gas Initiative (RGGI) as well as with western U.S. states.

## 3. Insurers', investors', and consumers' concerns related to climate change

Insurers and investors are becoming concerned about the financial implications of climate change. Insurance industry concerns about costs are translating into proactive incentives. Investors are also getting in on the action. (See Boxes 9 and 10 on insurers and investors.) For example, in early 2007, the first bond index designed to address the risks of global warming was launched. Goldman Sachs joined peers in the investment world, such as Citigroup and HSBC, in incorporating climate risk into company lending policies. Goldman Sachs also signaled their anticipation of carbon market growth by buying a 10% share in Climate Exchange, a trading platform that now dominates the European and U.S. markets.<sup>43</sup> Boutique investment firms such as Generation Investment are honing research techniques that analyze the “carbon intensity of profits” to understand which companies are better positioned to succeed in a carbon-constrained world. Finally, Merrill Lynch now has an index that identifies industry sectors that could benefit from energy efficiency through reduced CO<sub>2</sub> emissions and energy costs.<sup>44</sup>

Consumer interest in ‘climate conscious’ products also seems to be an emerging issue. Business-targeted events on carbon-conscious products and research on climate-conscious consumer size are now appearing.<sup>45</sup> Corporate leaders are calling out climate- and environment-friendly products, such as Home Depot<sup>46</sup> and GE’s Ecomagination products. In addition, financial services institutions are offering climate-related credit card programs. For example, Rabobank has a credit card that will offset carbon emissions from all credit card purchases through investments in ‘Gold Standard’ climate projects.<sup>47</sup> Barclay’s has a “Breathe” credit card that donates 50% of profits to climate change projects.<sup>48</sup> As a set, this growing interest in climate change among insurers, investors, and potentially even consumers has fueled further support for taking action on curbing emissions—including through market-based mechanisms.

### Limiting Factors (Air)

Despite these drivers, limiting factors to the expansion of carbon markets include:

- **Absence of national regulatory drivers in key countries**, most notably the U.S. as well as China and India;
- **Lack of clarity on if and how multiple regulatory markets may interrelate;**

Box 9:

### Investors & Climate Change

In 2007, global financial services firm JPMorgan and Innovest Strategic Value Advisors launched the first bond index designed to address the risks of global warming, “to enable credit investors to make return-driven investment decisions that systematically take the risks and opportunities created by global warming into account.” In addition, large investors, such as the California state pension fund (CalPERS) and the California teachers’ pension fund (CalSTRS), and TIAA-CREF—which represents \$406 billion assets—are taking note of shareholder concerns and future carbon-related risks, and are expressing preferences for “green” investments. Finally, the FTSE4Good index has issued specific criteria on climate change that requires companies to have a clear greenhouse gas reduction strategy and a “long-term public goal of significant reductions over a specified time period.” For investors, tracking corporate progress on climate issues will be increasingly straight-forward with the growing response to the Carbon Disclosure Project in light of demand for carbon transparency.

Sources: [www.jpmorgan.com/pages/jpmorgan/investbkl/solutions/research/jeni](http://www.jpmorgan.com/pages/jpmorgan/investbkl/solutions/research/jeni); *Ethical Performance*. 2006. “FTSE4Good Index Unveils Criteria on Climate Change.” (September); [www.cdproject.net/](http://www.cdproject.net/)

- **Technical challenges—both scientific and administrative—associated with integration of land use-based carbon sequestration** that would underpin more widespread investment in ‘bio-carbon,’ or carbon sequestration through land use, land use change, and forestry (LULUCF), and
- **Lack of clarity concerning a post-Kyoto international regime** as well as what the commitment of key countries, such as the U.S., India and China, will be in coming years.

The increased attention on climate change, however, means that there is growing pressure to address many of these limitations. Therefore, the question increasingly is not *whether* carbon markets will be robust and growing areas of transaction, but *how* companies should position themselves to decrease emissions and engage in these markets.

Table 5 summarizes current air emission-related markets.

Box 10:

### Insurers & Climate Change

In an effort to productively respond to climate change concerns, some insurance companies are now offering incentives for climate-aware actions. For example:

- MORE THAN insurance has reduced premiums for customers with LPG vehicles<sup>5</sup>, bi-fuel, FFV, biopower, dual-fuel and electric cars.
- Marsh, the world’s largest insurance broker, and AIG, the world’s largest insurer, have both launched carbon emission credit guarantees and other new renewable energy-related insurance products that seek to engage more companies in carbon offset projects and carbon emissions trading markets.

These new insurance policy offerings are in turn creating greater awareness of, and demand for, entering into carbon-related actions, including carbon markets.

*Source: Vigar, David. 2006. Climate Change: The Role of the Global Companies. London: Tomorrow’s Company; CERES. 2006. “Dozens of New Insurance Products Emerging to Tackle Climate Change and Rising Weather Losses.” [www.ceres.org/pub/publication.php?pid=0](http://www.ceres.org/pub/publication.php?pid=0); [www.royalsun.com/mediacentre/shownews.jsp?print=true&ref=179](http://www.royalsun.com/mediacentre/shownews.jsp?print=true&ref=179); [www.morethan.com/Pages/Products/Car/WhyChooseUs.aspx](http://www.morethan.com/Pages/Products/Car/WhyChooseUs.aspx)*

**Table 5:  
Air Emission-Related Markets**

Regulated/ Compliance Markets	<p>Cap-and-trade markets:</p> <ul style="list-style-type: none"> <li>■ <b>Kyoto Protocol's Clean Development Mechanisms, Joint Implementation, and Emissions Trading</b> unfccc.int/kyoto_protocol/mechanisms/items/1673.php</li> <li>■ <b>European Union's Emission Trading Scheme (EU ETS)</b> ec.europa.eu/environment/climat/emission.htm</li> <li>■ <b>Australia's New South Wales Greenhouse Gas Reduction Scheme</b> www.greenhousegas.nsw.gov.au/</li> </ul>
	<p>Emerging cap-and-trade markets and market-based emissions trading schemes:</p> <ul style="list-style-type: none"> <li>■ <b>U.S.' Regional Greenhouse Gas Initiative</b> www.rggi.org/</li> <li>■ <b>U.S.' California &amp; West Coast State Initiatives</b> www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm</li> <li>■ <b>Australia's National Emissions Trading Task Force</b> (http://www.emissionstrading.nsw.gov.au/)</li> </ul>
Relevant Legislation	<ul style="list-style-type: none"> <li>■ <b>Kyoto Protocol to the UN Framework Convention on Climate Change</b> unfccc.int/resource/docs/convkp/kpeng.pdf</li> <li>■ <b>Australia's New South Wales Greenhouse Gas Reduction Scheme</b> www.greenhousegas.nsw.gov.au/</li> <li>■ <b>U.S. State-level Policies and Legislation</b> www.pewclimate.org/what_s_being_done/in_the_states/state_legislation.cfm</li> <li>■ <b>California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB32)</b> (U.S., State of California) http://www.arb.ca.gov/cc/docs/ab32text.pdf</li> <li>■ <b>Oregon CO2 Standard</b> (U.S., State of Oregon) www.oregon.gov/ENERGY/SITING/docs/ccnewst.pdf</li> </ul>
Voluntary Markets	<p>Voluntary market players include:</p> <ul style="list-style-type: none"> <li>■ <b>The Chicago Climate Exchange</b> www.chicagoclimatex.com/</li> <li>■ <b>The Carbon Neutral Company</b> www.carbonneutral.com/pages/whatwedo.asp</li> <li>■ <b>Numerous service providers for individual consumers</b> e.g. TerraPass – www.terrapass.com/</li> <li>■ <b>Japanese Voluntary Emissions Trading Scheme</b> www.et.chikyukankyo.com/english/</li> </ul> <p>Key Standards:</p> <ul style="list-style-type: none"> <li>■ <b>Voluntary Carbon Standard</b> www.v-c-s.org/</li> <li>■ <b>CDM Gold Standard</b> www.cdmgoldstandard.org/</li> <li>■ <b>The Climate, Community, and Biodiversity Alliance (CCBA)</b> www.climate-standards.org/</li> </ul>

## B. Water

The drivers of water-related markets and business deals around payments for watershed services include:

### 1. Scientific evidence growing about water quantity and quality issues

There is growing documentation of water quantity and quality concerns around the world. The issues span from inadequate availability in arid areas—such as the U.S. southwest where Colorado River-fed Hoover Dam’s reservoir levels are a forty year low point,<sup>49</sup>—through excessive amounts of water in other areas, as vividly illustrated in 2007 flooding of parts of North Korea and South Asia. In addition, quality concerns exist, that range from pollution, such as contaminated water sources for 90% of the cities in China,<sup>50</sup> through human-inputs that lead to ecological dynamics, such as eutrophication and hypoxia,<sup>51</sup> which can fundamentally shift environmental systems and lower water quality.<sup>52</sup>

These issues are not only relevant to industrial access to water, but also affect community access, and ecological systems—including biodiversity. Together, current scientific evidence is highlighting the need for action to address the full range of water quantity and quality issues. Markets and payments for watershed services offer one set of approaches.

### 2. Concern rising over future water availability

Analysts predict a growing risk of droughts and water shortages,<sup>53</sup> particularly in arid and semi-arid environments where water tables are already low. These predictions are of particular concern in light of projections that water demand will double or triple within the next 50 years, primarily in developing countries given increasing needs for both electricity and drinking water.<sup>54</sup> In addition to these groundwater concerns, surface water issues are also emerging, particularly related to maintaining key infrastructure. For example, hydropower is particularly vulnerable as illustrated in Ghana, where the Akosombo Dam used to supply 100% of the country’s power and now provides only 60% due to four of the six turbines being above current water levels.<sup>55</sup> Inadequate water to run hydropower is only one issue that shows the linkages between environmental services and key infrastructure for business. Another issue is sediment and siltation, which can affect both hydropower and navigability of waterways. These concerns are all contributing to advocacy for new approaches for addressing water concerns.” (For example, see Box 11 on the Panama Canal).

### 3. Regional and national political pressure to take action on water issues

Water availability issues is likely to become more significant around major urban areas and metropolises, particularly in arid and semi-arid areas. If water is less reliably available, then it is likely to result in greater political pressure to address the issues. Inadequate water availability is already an industrial growth constraint in areas, including China, India, and Indonesia.<sup>56</sup> These supply shortfalls are likely to

Box 11:

#### The Panama Canal & Proposed Payments for Watershed Services

An example much earlier in its development is emerging from the Panama Canal region, where each ship requires 200 million liters of water for operable locks. The challenge is that overall canal water levels are decreasing, particularly in drier seasons. Scientists at the Smithsonian Tropical Research Institute advocate for reforesting the canal’s hillsides to ensure more regular water supply—as forested hills enable more predictable flows of water, rather than post-rain deluges. Deforestation is also resulting in erosion and about \$60 million in annual dredging fees.

To fund reforestation that would assist in addressing both water flow and sedimentation issues, ForestRe, a forestry insurance company, has proposed a corporate-underwritten 25-year bond that would pay farmers to reforest the hillsides and avoid further deforestation. ForestRe has proposed that canal users support a bond, using bond revenues to pay local farmers for changes in practices. To find buyers for the bond, ForestRe proposed to insurance companies that they lower premiums for anyone who purchased the bonds. Hence, companies that rely upon the canal, such as retailers and various automakers, would be potential bond buyers. Such a plan could help provide ongoing access to the canal and enhance freshwater supplies in the area.

Source: [rs.resalliance.org/2005/04/26/environmental-economics-and-the-economist/](http://rs.resalliance.org/2005/04/26/environmental-economics-and-the-economist/)

be exacerbated in the coming years as rainfall variability increases, which many scientists anticipate will occur with climate change, as water demand is projected to significantly increase.<sup>57</sup>

Within this context of inadequate availability and demand outstripping supply, there can be considerable political pressure from citizens for government action. For example, Egyptian villagers have held demonstrations protesting against government allocations of water from the Nile,<sup>58</sup> and in China there have been tens of thousands of “mass demonstrations” to demand action on range of issues including water pollution.<sup>59</sup>

The confluence of increasing water quantity issues (including too little as well as too much water), diminishing water quality, growing uncertainty around water availability, and increasing demand may result in demand for new approaches to water policy and management. Within this context, market-based mechanisms—including nutrient trading schemes as well as business-to-business “payment for watershed services”—are some of the alternatives that are emerging for consideration.

#### **4. Interest in new mechanisms for protecting water quality and quantity**

While policy action on water quality has deep roots, particularly in Europe and the U.S., the mixed results are leading to interest in exploring other approaches, including market-based mechanisms. Major efforts are now underway to identify new regional water quality strategies based on market-based mechanisms, such as the U.S. Environmental Protection Agency’s work with the NGO Forest Trends and the Ecosystem Marketplace to explore the potential of water quality markets, such as in the Chesapeake Bay region.<sup>60</sup>

#### **Limiting Factors (Water)**

Factors limiting the expansion of both water markets and self-organized payments for watershed services include:

- **Complex scientific models** that are needed to underpin water-related markets and business-to-business deals associated with watershed services, which are not insurmountable, but simply a consideration to factor into the establishment of various market-related mechanisms;
- **Need for site-specific approaches** that address particular water issues and socio-economic dynamics of a certain area, and
- **Political sensitivities around access to water** limiting the degree to which certain countries and communities would welcome water-related transactions that appear to commoditize water or limit access among the poor.

None of these issues are, however, insurmountable. Hydrological models developed for particular regions may be adaptable to similar geographies, such as across Mediterranean climates. Site-specific knowledge may exist in many regions, including awareness of core concerns related to access that can be factored into design of markets and business-to-business deals related to water.

All of these issues will be increasingly important as regions and nations address water issues in the coming years and companies develop corporate water strategies that adapt to a changing climate and growing demand. (For more information on this topic, please see the joint BSR / Pacific Institute Corporate Water Strategy Trends Report, entitled “At the Crest of a Wave: A Proactive Approach to Corporate Water Strategy.”) An overview of current water markets and illustrative payments for watershed services is laid out in table 6, on the next page.

**Table 6:**  
**Water Markets & Illustrative Payments for Watershed Services**

Regulated/ Compliance Markets	<ul style="list-style-type: none"> <li>■ <b>U.S. EPA Water Quality Trading</b> <a href="http://www.epa.gov/owow/watershed/trading.htm">www.epa.gov/owow/watershed/trading.htm</a></li> <li>■ <b>U.S. Clean Water Act, Wetlands Mitigation Banking</b> <a href="http://www.epa.gov/owow/wetlands/facts/fact16.html">www.epa.gov/owow/wetlands/facts/fact16.html</a></li> <li>■ <b>U.S.' State Nutrient Trading Programs</b> (Pennsylvania, Oregon, etc.) <a href="http://www.envtn.org/wqt/stateprograms_page.html">www.envtn.org/wqt/stateprograms_page.html</a></li> <li>■ <b>Australian State Forests of New South Wales' Reduction of Water Salinity Program</b>, where water transpiration credits earned by State Forests for reforestation are sold to irrigators for \$40/ha per year for 10 years and revenues are used to reforest private and public lands <a href="http://www.napswq.gov.au/publications/bilaterals/nsw/pubs/nsw-bilateral.pdf">www.napswq.gov.au/publications/bilaterals/nsw/pubs/nsw-bilateral.pdf</a></li> </ul>
Relevant Legislation	<ul style="list-style-type: none"> <li>■ <b>Forest Law 7575 – Payments for Environmental services program</b> (Costa Rica) <a href="http://www.fonafifo.com/paginas_english/foresty_credit/i_cf_entorno_legal.htm">www.fonafifo.com/paginas_english/foresty_credit/i_cf_entorno_legal.htm</a></li> <li>■ <b>Sloping Land Conversion Program</b> (China) <a href="http://www.cifor.cgiar.org/pes/publications/pdf_files/China_paper.pdf">www.cifor.cgiar.org/pes/publications/pdf_files/China_paper.pdf</a></li> <li>■ <b>Clean Water Act</b> (US) <a href="http://www.epa.gov/r5water/cwa.htm">www.epa.gov/r5water/cwa.htm</a></li> </ul>
Voluntary Markets	<ul style="list-style-type: none"> <li>■ <b>Costa Rica's Environmental Services Payment Program</b> <a href="http://www.fonafifo.com/english.html">www.fonafifo.com/english.html</a></li> <li>■ <b>Mexico's Payments for Hydrological Services</b> (PSA-H, 2003) <a href="http://www.ine.gob.mx/dgipea/download/draft_ecological_economics.pdf">www.ine.gob.mx/dgipea/download/draft_ecological_economics.pdf</a></li> </ul>
Voluntary Self-Organized Payments for Watershed Services <i>(illustrative examples)</i>	<ul style="list-style-type: none"> <li>■ <b>Perrier Vittel (now Nestle Waters)</b> has paid upland farmers for specific practices to maintain water quality <a href="http://www.iied.org/NR/forestry/documents/Vittelpaymentsforecosystemservices.pdf">www.iied.org/NR/forestry/documents/Vittelpaymentsforecosystemservices.pdf</a></li> <li>■ <b>New York City</b> is paying upland farmers to maintain water quality and quantity <a href="http://www.nyc.gov/html/dep/html/home/home.shtml">www.nyc.gov/html/dep/html/home/home.shtml</a></li> <li>■ <b>A Beer Company, Municipal Water Company, and Electric Power Company</b> pay for upstream conservation outside of Quito, Ecuador <a href="http://www.iied.org/pubs/pdf/full/9285IIED.pdf">www.iied.org/pubs/pdf/full/9285IIED.pdf</a></li> </ul>

**Drivers of  
Biodiversity-  
Related Markets**

**C. Biodiversity**

Biodiversity is defined, by the U.N. Convention on Biological Diversity, as the variety of life on earth, encompassing the diversity within and among gene pools, species, and ecosystems.<sup>62</sup> While biodiversity is not an environmental service, it is an essential component of maintaining the structure, function and resilience of ecological systems. In doing so, biodiversity is integral to maintenance of environmental services.

The drivers of biodiversity-related markets and offsets include:

- 1. Scientific evidence of the role of biodiversity in ensuring reliable access to natural resources**  
Scientists have documented relationships between biodiversity levels and ecological resilience.<sup>63</sup> The implication is that biodiversity loss could impact food production, water quality and carbon dioxide levels more than previously thought. The unintended consequences of biodiversity loss, therefore, could include less reliable natural resource flows, from water through timber and many other elements. Connections between biodiversity loss, shifts in ecological structure and function, as well as diminished availability to water could be quite material to the core business. Market-based mechanisms, and biodiversity offsets, may offer a pathway with which to address these issues.
- 2. Concern emerging in key financial services institutions**  
While still nascent, recognition of the risks of biodiversity loss is growing among investors. In response, some financial service institutions have developed guidelines to limit risk and increase incentives

for conservation. For example, Goldman Sachs' environmental policy<sup>64</sup> highlights biodiversity as well as environmental services and received accolades from groups ranging from the Rainforest Action Network through the former Director of the Millennium Ecosystem Assessment.<sup>65</sup> In addition, Goldman Sachs' endowment to the Wildlife Conservation Society of 680,000 acres in Tierra del Fuego not only boosted their reputation as a global corporate citizen but also catalyzed work on an environmental governance framework and investment criteria.<sup>66</sup>

### 3. Permitting, lawsuits, and regulatory concerns

Biodiversity issues have been included in environmental impacts assessments (EIAs) for years. Increasingly, biodiversity is being integrated into permitting processes. (For example, see Box 12 on Associated British Ports and Beaufort Sea oil exploration.) At the same time, in some countries, the tolerance level for impacts, as well as the degree of proof required, is decreasing. As lawsuits are being filed to challenge permits on the grounds of improper assessment of environmental impacts, particularly related to biodiversity-issues, such as marine animal migrations,<sup>67</sup> it is clear that the onus is increasingly on the developer to demonstrate conclusively the impact.

Finally, signaling policymakers' concern, there are a range of regulatory-driven markets related to species and habitat conservation, such as the U.S. conservation and wetland banks<sup>68</sup> (related to the U.S. Endangered Species Act and Clean Water Act, respectively) and the adapted Australian approach of Biobanking. The idea behind these "banks" is simply that by taking action to preserve, enhance or restore lands and then placing a conservation easement on the land—that restricts activities and development on a particular parcel—the habitat will be protected in perpetuity. The landowner who holds this easement is then granted credits by a regulating entity for the determined value of the habitat.<sup>69</sup> A growing number of companies have engaged in these conservation and wetland banking markets, including Chevron, Tenneco, and Florida Power and Light.

#### Limiting Factors (Biodiversity)

A number of factors have limited expansion and growth of biodiversity-related markets and payments, including:

- Long lead times between environmental impacts and resulting business implications, which contribute to the 'invisibility' of ecological and biodiversity-related underpinnings of business challenges, and
- Lack of appropriate valuation techniques and internal rates of return and discount factors.

As the technical aspects of the field mature, more is being learned about measuring, valuing, and maintaining biodiversity. All of these elements may serve as the 'building blocks' for the potential future

Box 12:

#### Wildlife Habitat Impacts & Permitting: The Case of Associated British Ports and Oil Exploration in Beaufort Sea

In 2005, the U.K.'s largest port operator, Associated British Ports (ASP), lost £155 million in market value after a permitting agency refused development of a new deepwater terminal. A significant component of denial of the proposed development was based environmental impacts, including on marine life.

In 2007, a U.S. court halted oil exploration in the Beaufort Sea pending resolution of a lawsuit filed by Native Alaskans and conservation groups on the grounds that the permitting agency did not adequately assess environmental impacts. The case highlighted concerns about harm to bowhead and beluga whales, as well as polar bears and other marine wildlife. In addition, the issue of the timing of exploration was critiqued, as it was due to begin at the peak of bowhead whale migration and feeding in the area.

Both of these cases show how biodiversity considerations can affect business plans and may increasingly need to be considered to avoid expensive regulatory and legal challenges.

*Source: Ivo Mulder. 2007. "Biodiversity, the next challenge for financial institutions?" Gland, Switzerland: IUCN, [www.iucn.org/themes/business/Docs/biodiv\\_challenge\\_ivo\\_%20June%202007.pdf](http://www.iucn.org/themes/business/Docs/biodiv_challenge_ivo_%20June%202007.pdf); Environmental News Service. 2007. "Court Halts Shell Oil Exploration in Beaufort Sea." (August 15) [www.ens-newswire.com/ens/aug2007/2007-08-15-09.asp](http://www.ens-newswire.com/ens/aug2007/2007-08-15-09.asp)*

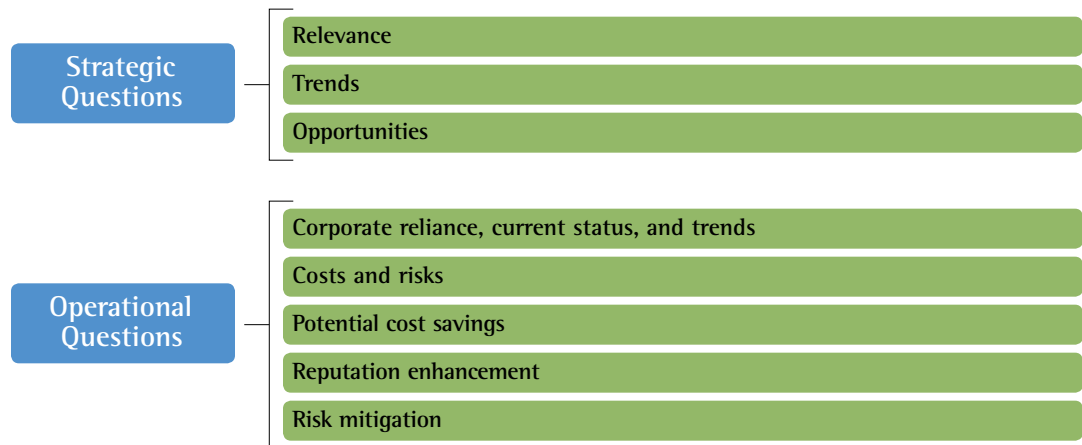
creation or expansion of biodiversity-focused markets or other market-based incentives for biodiversity conservation. Today's biodiversity markets and offsets are summarized in table 7 below.

**Table 7:  
Biodiversity Markets & Pilot Offset Programs**

Regulated/ Compliance Markets	<ul style="list-style-type: none"> <li>■ <b>U.S.A.:</b> <ul style="list-style-type: none"> <li>– <b>Conservation Banking</b>, a cap-and-trade system for creating and trading endangered species credits that is used to protect lands in perpetuity and offset negative impacts to specific species and their habitat. <a href="http://www.fws.gov/endangered/landowner/banking.7.05.pdf">www.fws.gov/endangered/landowner/banking.7.05.pdf</a></li> <li>– <b>Wetlands Banking</b>, driven by the Clean Water Act, Section 404, that protects wetlands. <a href="http://www.epa.gov/owow/wetlands/facts/fact16.html">www.epa.gov/owow/wetlands/facts/fact16.html</a></li> </ul> </li> <li>■ <b>Australia's Biodiversity Banking</b> <a href="http://www.epa.nsw.gov.au/threatspec/biobankscheme.htm">www.epa.nsw.gov.au/threatspec/biobankscheme.htm</a></li> </ul>
	<p><i>Potential Emerging Markets:</i></p> <ul style="list-style-type: none"> <li>■ <b>France, South Africa, and several Latin American nations</b> are considering use of conservation and mitigation banking programs<sup>70</sup></li> </ul>
Relevant Legislation	<ul style="list-style-type: none"> <li>■ Wetland Banking (U.S. Clean Water Act)</li> <li>■ Conservation Banking (U.S. Endangered Species Act)</li> <li>■ Habitats and Birds Directive (EU)</li> <li>■ Offsets for Forest Regulation and National System of Conservation Units (Brazil)</li> <li>■ Federal Law for the Protection of Nature and Landscape (Switzerland)</li> <li>■ New South Wales Green Offsets Scheme and other initiatives (Australia)</li> <li>■ Biodiversity offsets program (Netherlands)</li> <li>■ National Forestry Commission Fund to finance forest environmental services (Mexico)</li> </ul>
Voluntary Payments	<ul style="list-style-type: none"> <li>■ <b>Conservation easements</b>, which offer landowners a payment to restrict land use according to specified conservation parameters in perpetuity</li> <li>■ <b>Management contracts and leases</b>, which focus on maintaining biodiversity on parcels of land without changing future development prospects</li> </ul>
Pilot Offsets	<p>Merck, Chevron, Shell, Rio Tinto, American Electric Power, Newmont, Anglo American, and PG&amp;E are all engaged in biodiversity pilot offsets</p>

# Assessing Strategic & Operational Relevance of Environmental Services

A series of questions can guide corporate decision-makers in both assessing the relevance of environmental services to the business, and considering whether the issues are already being captured within current environmental impact assessment (EIA) protocols. The questions can be divided in the following way:



Suggested questions are listed below and are followed by a series of decision trees that can guide development of the corporate approach, implementation, and integration phases of work on environmental services. Corporate managers may wish to adapt both these questions and the decision trees to ensure that they are most effective within a specific business context.

## Strategic Questions

### 1. Strategic Questions

#### A. Relevance

What are leading financial service institutions’ adoption rates of environmental service-related decision-making parameters?

- Could these new parameters affect our company’s access to capital?
  - If so, what proactive actions could position our company for favorable review?
- Are these new financial service guidelines influencing criteria of other key decision makers—such as insurers—around issues of liability or access to resources?
  - If so, what proactive actions could mitigate liability risk and increase access to resources?

Are other key stakeholders focusing on environmental services in their inquiries to our company that could become reputation or brand issues?

- If so, are current environmental impact assessment (EIA) and stakeholder outreach approaches appropriate for understanding and addressing the issues?

#### B. Trends

What internal roles or external resources might be needed to stay updated on emerging issues and trends associated with strategic relevance and risks associated with environmental services?

### C. Opportunities

- Do either environmental markets or business-to-business deals associated with environmental services present opportunities for building reputation and brand in ways that could translate into improved access to capital and resources?
- Are there environmental services that our company can positively affect?
  - Would our company get preferential treatment if we did so?
  - Would our company see a public relations boost, both at the project and corporate level, from investing in environmental services?
- Do environmental markets or business-to-business deals associated with environmental services offer:
  - a hedge against future unreliable supply of key inputs?
  - a hedge against regulatory risk?
  - a cost-effective approach to regulatory compliance (e.g. investing in conservation banking—rather than risking litigation associated with endangered species lost to development)?
  - an opportunity to transfer liability?
- Are there opportunities to become sellers within environmental markets that may translate into new revenue streams or increases in real estate value, such as in:
  - Voluntary Carbon Markets (particularly through land use practices that sequester CO<sub>2</sub>, e.g., tree planting)?
  - Watershed services?
  - Wetlands and Conservation Mitigation Banking?

## Operational Questions

### 2. Operational Questions

#### A. Corporate Reliance, Current Status, and Trends

- Has an environmental service ‘footprint’ and risk analysis been conducted to assess how our company’s operations and supply chain:
  - relies on current flows of environmental services?
  - affects environmental services (either positively and negatively)?
- What scientific research exists concerning the status of each essential environmental service-based input?
  - For instance, if we are interested in the availability of freshwater, have we considered:
    - time series data on a water table (is it dropping or holding stable?) and recharge rates at a particular site,
    - percentage of regional water that comes from:
      - forested areas, with data on land use and flow rates,
      - glacier sources, with data on melt rates / projections,
      - climate change related projections on shifting rainfall patterns,
    - percentage of local community:
      - with access to clean drinking water, and
      - income spent on purchasing drinking water.

- Are any of the key environmental services on which we rely trending downward in ways that either directly affect operations or indirectly affect the company through possible ‘license to operate’ issues?
  - If so:
    - What proactive risk mitigation measures should be considered and assessed?
      - Would engaging in environmental markets or payments for environmental services be an effective risk mitigation approach among others pursued?
    - What proactive plans for adaptation should be developed?
- What are the future demand trends for environmental services in key sourcing regions and markets?
  - What are the implications of these trends for our company’s supply chain and operations?

### **B. Costs & Risks**

- What costs are associated with:
  - Identifying promising environmental markets or business-to-business deals associated with environmental services?
  - Collecting needed ecological data?
  - Working through legal, permitting, and other administrative details?
  - Verifying and monitoring environmental services over time?
- Could engaging in environmental markets lead to:
  - New liabilities? If so, is there available insurance to protect against this risk?
  - Increased regulatory scrutiny or additional fees?
  - Decreased property value?
- Are there reputation risks associated with engaging in particular environmental markets (e.g., no government standards, lack of regulation, lack of verifiers, insurance, vocal critics, etc.)?
  - If so, how can our company hedge these risks?

### **C. Potential Cost-Savings**

- Do environmental markets offer cost-effective regulatory compliance or hedges against regulatory risk?
- Is there a connection between intact ecosystems (forest cover, wetlands, etc.) and infrastructure costs?
  - If so, are there ways to leverage environmental markets to lower operations and management costs?

### **D. Reputation Enhancement**

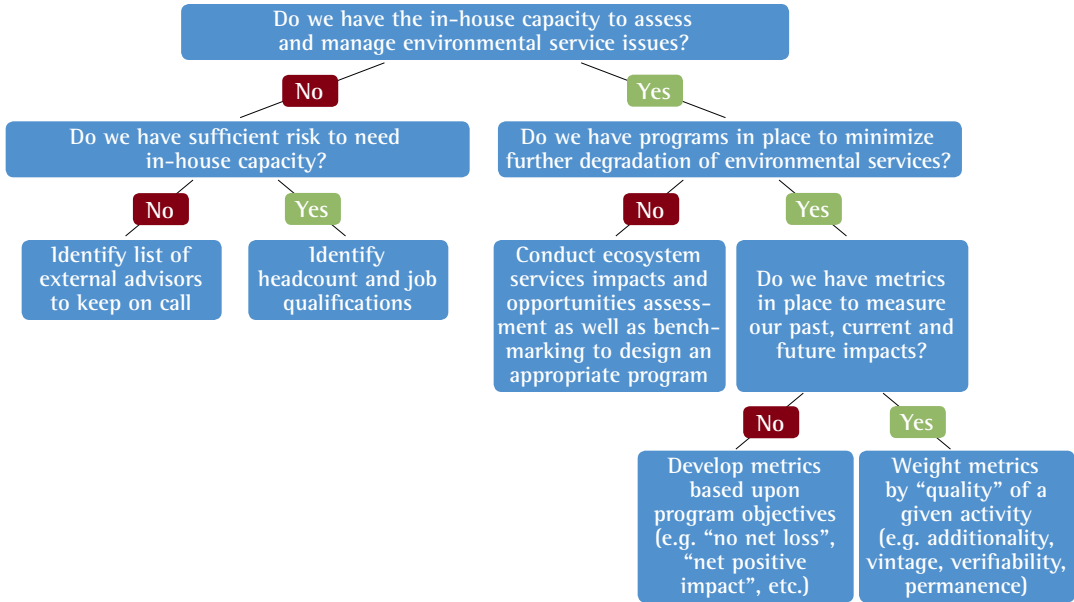
- Would protecting environmental services reduce the burden on local, regional and national governments to conserve environmental quality and reduce health risks?
  - If so, is it possible to provide evidence to regulators that our company is taking measures that should be rewarded with regulatory goodwill, such as faster time-to-permitting, or favored partner status in future investments?

## E. Risk Mitigation

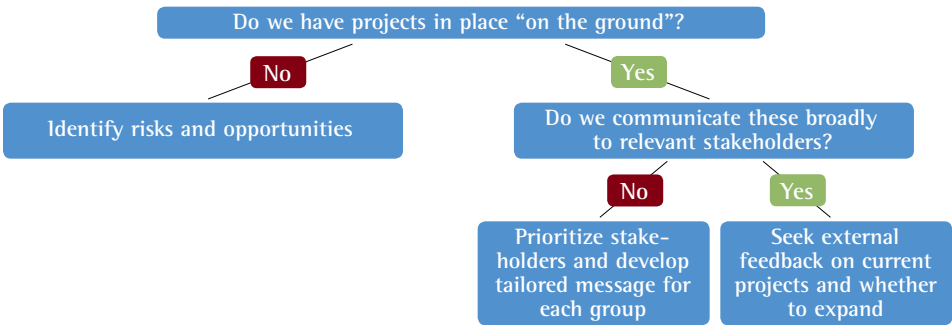
- Do we have contingency plans in place for shortages of each environmental service relevant to our business? Have we assessed scenarios for:
  - Price elasticity estimates should input costs rise?
  - Retail site selection, design and development implications in the event of environmental service-related disruptions?
- In regions with no active environmental markets, have we assessed if voluntary business-to-business deals or payments for environmental services could present new reputational opportunities or even mitigate business risks?
  - Have we considered:
    - What is the current status of environmental services in a particular area?
    - What business risks does this status present?
    - What are the resource management practices that are driving the environmental service status and trends?
    - What changed resource management regimes are needed for desired environmental service outcomes?
    - Are there external threats that might undermine the outcome (e.g. climate change)?
  - If voluntary payments for environmental services could mitigate business risks at a certain site, then who owns the land or aquatic zone at the site in question? Who uses the land or aquatic resources?
    - If the owners and users are not the same person (or group):
      - Do these parties have an agreement regarding use rights (e.g. fishing licenses)?
      - Are the parameters of this agreement enforced or enforceable?
    - If not, is it feasible to overlay another agreement in such a complex area?
    - If so, should business-to-business deals or payments for ecosystem services be explored:
      - through an agreement with only the land owner(s) with specific guarantees that the agreement will be enforced with multiple users?
      - through separate agreements, with the land owner and land users?

Figure 4:  
Illustrative “Decision Tree” for Structuring Discussions about Corporate Approach, Implementation and Integration of Environmental Services

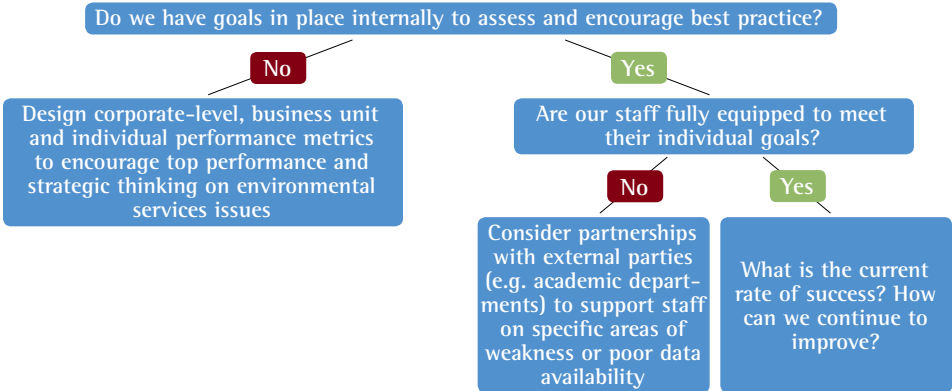
Phase 1. Corporate Approach



Phase 2. Implementation

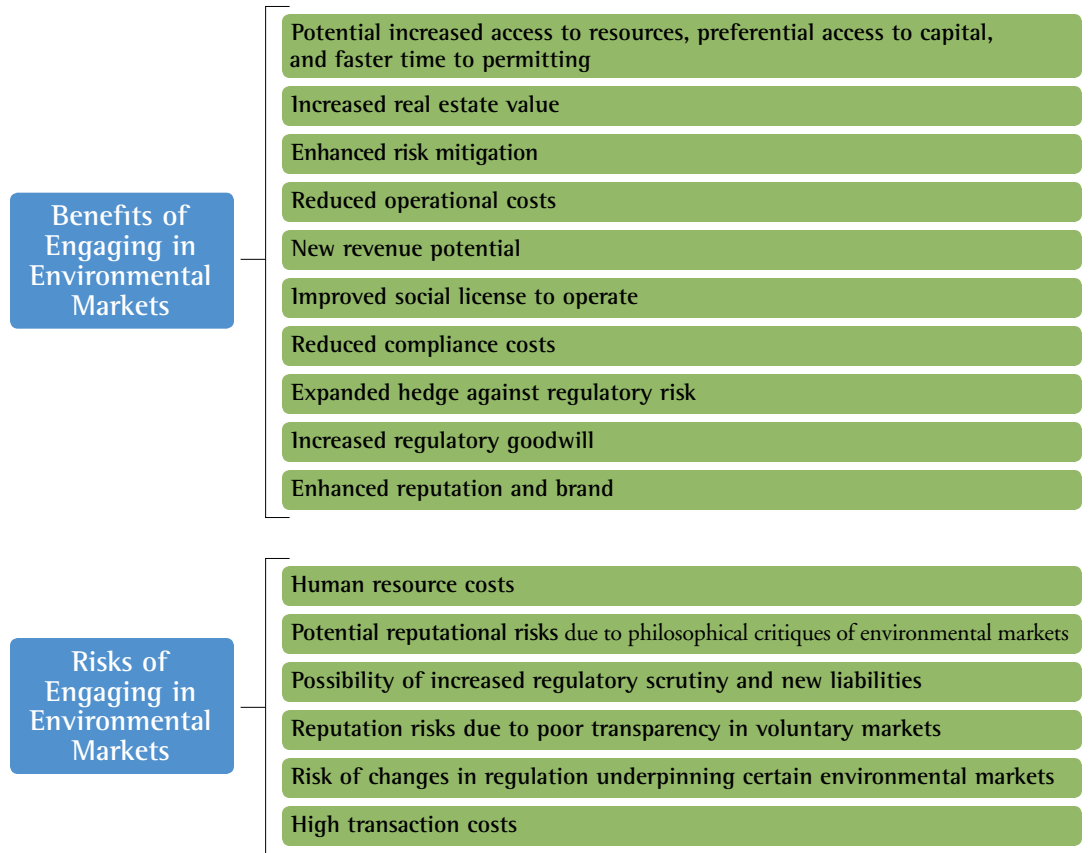


Phase 3. Integration



# Perceiving Risks & Opportunities

While the opportunities to engage in environmental markets and payments will vary from region and depend on a company’s land-based assets, generally speaking, environmental markets are likely to offer a range of strategic and operational benefits. Potential risks also exist, as summarized in the figures below.



One approach for companies to assess both potential benefits and risks would be to:

- discuss a series of key assessment questions to truly determine if benefits exist in engaging in environmental markets, and
- “map” these elements as they relate to a specific property or even to a region of operations.

Recommended questions and an illustrative mapping exercise is offered below.

## Suggested Questions for Assessing Environmental Market-Related Opportunities

If our company were to engage in specific environmental markets or payments for environmental services, in particular countries or specific sites, could we:

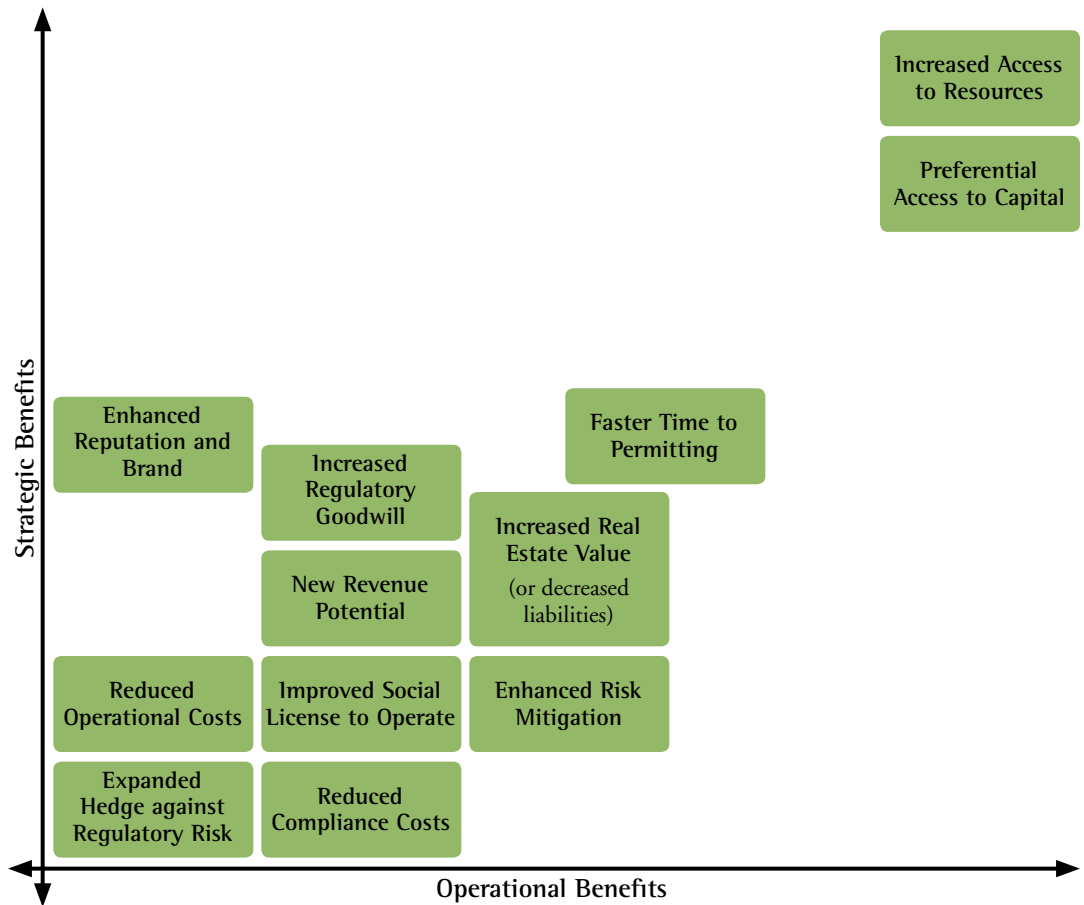
- Gain preferential access to key business inputs by generating regulatory goodwill and enhancing our brand and reputation?
  - Have we assessed if / how actions that we take in our operations can reduce or enhance potential effects on environmental services?
  - Can we provide evidence to regulators that our company is taking measures that could be grounds for faster permitting or other signs of regulatory goodwill?
  - Have we assessed how key stakeholders perceive of environmental markets and payments for environmental services?
  - Have we considered the potential positive opportunities, particularly related to:
    - carbon sequestration through land use, land use change, and forestry (including, but not limited to, tree planting, soil carbon sequestration, and/or eco-agriculture practices)?
    - watershed management (such as siltation, erosion control, etc.) through land use changes?
    - habitat restoration, conservation, or other biodiversity-related actions?
- Improve our ability to access capital?
  - Have we assessed the trends associated with financial service institutions' integrating environmental parameters into business decision-making process, such as adoption of the Equator Principles\* or other specific environmental guidelines that include attention to environmental services?
- Hedge against unreliable future supply of key environmental inputs (such as water)?
  - Have we reviewed scientific research on the status of needed natural resource-based inputs in key supply centers, such as availability of water?
- Tap into new revenue streams or increased real estate value?
  - Have we assessed the opportunities to become sellers within environmental markets, focused on:
    - Voluntary Carbon Markets (particularly through land use practices that sequester CO<sub>2</sub>, e.g., tree planting)?
    - Wetlands and Conservation Mitigation Banking?
- Decrease operations and management costs?
  - Have we explored if there is a connection between intact ecosystems (forest cover, wetlands, etc.) and corporate infrastructural maintenance costs?
  - Have we conducted an environmental service 'footprint analysis' to assess reliance and potential impacts on environmental services?

\* The Equator Principles were drafted by ABN Amro, Barclays, Citigroup and WestLB in collaboration with the International Finance Corporation of the World Bank. Fifty-six financial institutions from twenty-one countries have adopted the Equator Principles. (<http://www.equator-principles.com/join.shtml>)

After answering these questions, corporate decision-makers could consider creating a “map” of strategic and operational benefits of engaging in environmental markets.

The figure below illustrates how such a map could be put together. The location of particular benefits along the two axes may change from company to company as well as from region to region. In addition, corporate managers may find that there other benefits, not listed within this set. Therefore, it is essential for corporate managers to carefully calibrate such an assessment to a specific context.

**Figure 5:**  
**Potential Benefits of Engaging in Environmental Markets**



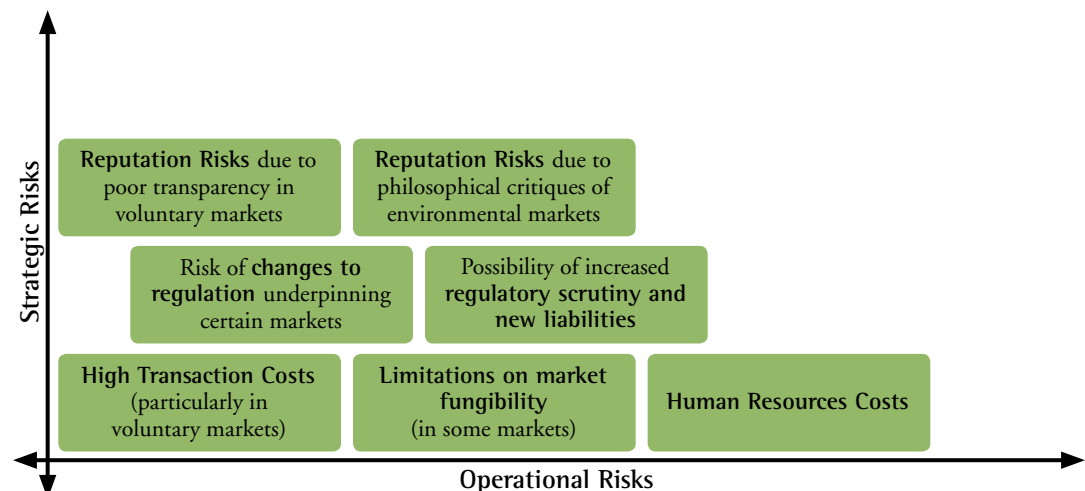
## Suggested Questions for Assessing Environmental Market-Related Risks

If our company engages in environmental markets or payments for environmental services, could we:

- Risk reputation damage?
  - Is the market regulatory or voluntary?
    - If voluntary, do reputable standards, brokers and advisors exist that can mitigate against the chance of reputation risk?
  - How do key stakeholders perceive of particular environmental markets?
  - What have been other companies’ experiences with engaging in the same (or a similar) market to the one that we are considering?
- Take on new liabilities for which there is no insurance?
  - Have we assessed specific environmental markets in terms of new liabilities and available insurance?
- Experience increased regulatory scrutiny?
  - Have we assessed the experience of other market entrants, for each specific environmental market, in terms of pre- and post-regulatory engagement and scrutiny?
- Engage in a market that fails?
  - Have we assessed the probability that credits we purchase will be able to be proven and that there will be clear evidence that services are delivered for the investment we make?
- Encounter high transaction costs?
  - Have we assessed cost estimates associated with specific environmental markets which appear to be most promising given our environmental services ‘footprint’ assessment calibrated to the specifics of our business?

As with the benefits assessment, corporate managers may find that it is useful to “map” potential risks associated with engaging in environmental markets. An illustrative map is included below, with caveat that both the position of the risks along the two axes and the set of risks listed may vary from company to company as well as from region to region. Therefore, it is essential that corporate managers undertake a focused assessment of these risks for their particular company and a specific region.

**Figure 6:**  
Potential Risks of Engaging in Environmental Markets



## Tab 7

# Resources

This tab offers resources for assessing materiality of environmental services and environmental markets, as well as lists of potential organizations with which to partner. The following table lays out a few of the key tools and resources that currently exist to assist in making smart decisions about environmental market involvement.

**Table 8:**  
Materiality Assessment Resources (Part 1)

	Carbon/Greenhouse Gas Emissions	Water Quantity & Wastewater Quality	Biodiversity Impacts
Measurement	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Energy use and type in terms of emissions produced</li> <li>Materials' and products embodied energy</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li><i>Greenhouse Gas Protocol (WRI–WBCSD)</i> <a href="http://www.ghgprotocol.org/templates/GHG5/layout.asp?MenuID=849">www.ghgprotocol.org/templates/GHG5/layout.asp?MenuID=849</a></li> <li>The Business Energy Analyzer for companies' energy use along with customized energy efficiency improvement recommendations <a href="http://www.energyguide.com">www.energyguide.com</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Direct water use / inputs</li> <li>Embodied water use (in products, processes, etc.)</li> <li>Wastewater quality, temperature, quantity, etc.</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li><i>AWWA's Water Efficiency Clearinghouse &amp; Unit Converter Tool</i> <a href="http://www.awwa.org/waterwiset/">www.awwa.org/waterwiset/</a></li> <li><i>GEMI's Water Sustainability Tool</i> <a href="http://www.gemi.org/water/overview.htm">www.gemi.org/water/overview.htm</a></li> <li><i>WBCSD Global Water Tool</i> <a href="http://www.wbcSD.org/web/watertool.htm">www.wbcSD.org/web/watertool.htm</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Impacts through direct operations / infrastructure as well as supply chain</li> <li>Contributions through fostering habitat at certain sites, etc.</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>Business &amp; Biodiversity Offset Program's tools (under development) <a href="http://www.forest-trends.org/biodiversityoffsetprogram/">http://www.forest-trends.org/biodiversityoffsetprogram/</a></li> <li>Insight Investment and Fauna &amp; Flora International's Biodiversity Benchmarking Methodology, integrating risk management processes, ISO14001 and best practice in sustainability management systems (<a href="http://www.unepfi.org/fileadmin/events/2007/london/5grigg_kate.pdf">http://www.unepfi.org/fileadmin/events/2007/london/5grigg_kate.pdf</a>)</li> <li><i>Handbook of Biodiversity Methods: Survey, Evaluation and Monitoring</i> <a href="http://www.cambridge.org/uk/catalogue/catalogue.asp?isbn=9780521823685&amp;css=fro">www.cambridge.org/uk/catalogue/catalogue.asp?isbn=9780521823685&amp;css=fro</a></li> </ul>
Issue Identification	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Types (and relative potency) of greenhouse gas emitted</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>Follow increasingly standardized protocols / approaches such as:</li> <li><i>Greenhouse Gas Protocol (WRI–WBCSD)</i> <a href="http://www.ghgprotocol.org/templates/GHG5/layout.asp?MenuID=849">www.ghgprotocol.org/templates/GHG5/layout.asp?MenuID=849</a></li> <li><i>The Business Energy Analyzer</i> for companies' energy use along with customized energy efficiency improvement recommendations <a href="http://www.energyguide.com">www.energyguide.com</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Demand vs. supply in specific operational / supply chain sites (e.g., assessing ground water levels and trends, etc.)</li> <li>In-stream water temperature, quality, and quantity adjacent to / near specific operational / supply chain sites</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>Water quality analysis <a href="http://www.nutrientnet.org/">www.nutrientnet.org/</a></li> <li>Water table maps / trend analyses</li> <li>Water quality monitoring</li> <li>Sources? National and/or State Government Agencies / Ministries, such as: <ul style="list-style-type: none"> <li>USGS <a href="http://geography.usgs.gov/#">geography.usgs.gov/#</a>;</li> <li>State Environmental / Natural Resource Management Agencies <a href="http://www.dnr.state.wi.us/landscapes/maps/state/waterdepth.htm">www.dnr.state.wi.us/landscapes/maps/state/waterdepth.htm</a></li> <li>The National Council for Science and the Environment's Earth Portal (<a href="http://www.EarthPortal.org">www.EarthPortal.org</a>)</li> </ul> </li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>Assess impacts in terms of landscape-level ecological parameters (e.g., biodiversity hotspots, areas of high endemism, key 'refugia' / habitat amidst high fragmentation, etc.)</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>Compare project locations to: <ul style="list-style-type: none"> <li>hotspot maps (e.g., Conservation International's maps - <a href="http://www.biodiversityhotspots.org/xp/Hotspots/resources/maps.xml">www.biodiversityhotspots.org/xp/Hotspots/resources/maps.xml</a>)</li> <li>poverty and natural resource-dependent populations maps, <a href="http://www.poverty-map.net/mapsgraphics/">www.poverty-map.net/mapsgraphics/</a></li> <li>Biodiversity Analysis Tool, <a href="http://www.environment.gov.au/biodiversity/abif/bat/what-is.html">www.environment.gov.au/biodiversity/abif/bat/what-is.html</a></li> <li>WRI's Earth Trends/Environmental Information Portal, <a href="http://earthtrends.wri.org/">earthtrends.wri.org/</a></li> <li>The National Council for Science and the Environment's Earth Portal, <a href="http://www.EarthPortal.org">www.EarthPortal.org</a></li> </ul> </li> </ul>

**Table 8:  
Materiality Assessment Resources (Part 2)**

	Carbon/Greenhouse Gas Emissions	Water Quantity & Wastewater Quality	Biodiversity Impacts
Valuation	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ <i>Non-regulatory</i>: costs of non-action in terms of brand value and/or stakeholder expectations</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ Standard corporate valuation tools</li> <li>■ <i>For forest-based carbon</i>: <a href="http://www.winrock.org/ecosystems/publications.asp?BU=9086#s4">www.winrock.org/ecosystems/publications.asp?BU=9086#s4</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ Assess cost of (depending on issues at hand): <ul style="list-style-type: none"> <li>– <i>water quality</i>, including treating water</li> <li>– <i>water quantity</i>, including trucking water</li> </ul> </li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ Standard corporate valuation tools and <i>Cross-Cutting</i> tools such as: <ul style="list-style-type: none"> <li>– The Environmental Valuation Reference Inventory <a href="http://www.evri.ca/">www.evri.ca/</a></li> <li>– The EcoValue Project <a href="http://ecovalue.uvm.edu/evp/default.asp">ecovalue.uvm.edu/evp/default.asp</a></li> <li>– The Nature Valuation and Financing Network <a href="http://topshare.wur.nl/naturevaluation">topshare.wur.nl/naturevaluation</a></li> <li>– The National Academies Press <i>Valuing Ecosystem Services</i> <a href="http://www.nap.edu/books/030909318X/html/">www.nap.edu/books/030909318X/html/</a></li> <li>– U.N.’ Integrated Environmental and Economic Accounting <a href="http://unstats.un.org/unsd/envAccounting/seaa.htm">unstats.un.org/unsd/envAccounting/seaa.htm</a></li> <li>– Ecosystem Valuation.org <a href="http://www.ecosystemvaluation.org/">www.ecosystemvaluation.org/</a></li> </ul> </li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ Assess cost of replacing / restoring habitat</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ WWF-IUCN’s Biodiversity Economics Program <a href="http://biodiversityeconomics.org/library/browse_the_library_by_major_theme/valuations_and_indicators/index.html">biodiversityeconomics.org/library/browse_the_library_by_major_theme/valuations_and_indicators/index.html</a></li> <li>■ OECD’s Handbook on Biodiversity Valuation <a href="http://www.oecd.org/document/11/0,2340,en_2649_34285_34312139_1_1_1_1_00.html">www.oecd.org/document/11/0,2340,en_2649_34285_34312139_1_1_1_1_00.html</a></li> <li>■ Australian Government’s “Making Economic Valuation Work for Biodiversity Conservation” <a href="http://www.environment.gov.au/biodiversity/publications/economic-valuation/play.html">www.environment.gov.au/biodiversity/publications/economic-valuation/play.html</a></li> </ul>
Innovation/ Re-design	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ Operations / processes for energy efficiency</li> <li>■ Products for low (embodied) carbon/ GHG intensity and (operational) energy efficiency</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ US EPA’s Energy Star energy-efficiency program <a href="http://www.energystar.gov/index.cfm?c=industry.bus_industry_info_center">www.energystar.gov/index.cfm?c=industry.bus_industry_info_center</a></li> <li>■ Green Building <a href="http://www.usgbc.org/">www.usgbc.org/</a> and <a href="http://www.epa.gov/greenbuilding/">http://www.epa.gov/greenbuilding/</a></li> <li>■ Energy efficient design resource “clearinghouses” such as: <a href="http://www.energydesignresources.com/">www.energydesignresources.com/</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ Operations / processes for water efficiency</li> <li>■ Products for low (embodied) water and (operational) water efficiency</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ <i>AWWA’s Water Efficiency Clearinghouse &amp; Unit Converter Tool</i> <a href="http://www.awwa.org/waterwiser/">www.awwa.org/waterwiser/</a></li> <li>■ <i>GEMI’s Water Sustainability Tool</i> <a href="http://www.gemi.org/water/overview.htm">www.gemi.org/water/overview.htm</a></li> <li>■ <i>U.S. EPA’s Water Efficiency Program</i> <a href="http://www.epa.gov/owm/water-efficiency/index.htm">www.epa.gov/owm/water-efficiency/index.htm</a></li> </ul>	<p><b>What?</b></p> <ul style="list-style-type: none"> <li>■ Explorations / developing projects for ‘no net loss’ biodiversity</li> <li>■ Existing operations / processes for lessening potential impacts</li> </ul> <p><b>How?</b></p> <ul style="list-style-type: none"> <li>■ Business &amp; Biodiversity Offset Program’s tools (under development) <a href="http://www.forest-trends.org/biodiversityoffsetprogram/">www.forest-trends.org/biodiversityoffsetprogram/</a></li> </ul>

In order to assist market entrants, an increasing number of service providers are emerging. The table below lists a few key areas of expertise that are commonly outsourced together with illustrative service providers.

**Table 9:  
Key Areas of Environmental Markets Expertise & Illustrative Service Providers**

Type of Expertise	Brief Description	Illustrative Service Providers
Brokers, Advisors and/or Investment Vehicles	<ul style="list-style-type: none"> <li>Assistance with sourcing, developing and trading</li> </ul>	<p><b>Carbon / Greenhouse Gases:</b>            Cantor CO2e <a href="http://www.cantorco2e.com/">www.cantorco2e.com/</a>            Evolution Markets <a href="http://www.evomarkets.com/">www.evomarkets.com/</a>            Greenstream <a href="http://www.greenstream.net/">www.greenstream.net/</a>            GT Energy <a href="http://www.gtenvfin.com/welcome.html">www.gtenvfin.com/welcome.html</a>            Natsource <a href="http://www.natsource.com/">www.natsource.com/</a>            Spectron <a href="http://www.spectrongroup.com/">www.spectrongroup.com/</a>            Ecosecurities <a href="http://www.ecosecurities.com/">www.ecosecurities.com/</a>            Edinburgh Centre for Climate Management  <a href="http://www.eccm.uk.com/index.htm">www.eccm.uk.com/index.htm</a></p> <p><b>Biodiversity:</b>            Wildlands Inc. <a href="http://www.wildlandsinc.com/">www.wildlandsinc.com/</a></p> <p><b>Cross-Cutting / Multiple Environmental Services:</b>            Ecosystem Investment Partners  <a href="http://www.ecosystempartners.com/index.html">www.ecosystempartners.com/index.html</a>            New Forests Pty. <a href="http://www.newforests.com.au/">www.newforests.com.au/</a></p>
Vehicle and/or Certification	<ul style="list-style-type: none"> <li>Evaluation of potential services or products to be sold within environmental markets which follow specific guidelines</li> </ul>	<p><b>Carbon / Greenhouse Gases:</b>            SGS Group  <a href="http://www.sgs.com/sgs_climate_change_programme-6.htm">www.sgs.com/sgs_climate_change_programme-6.htm</a>            TUV <a href="http://www.global-warming.de/e/1392">www.global-warming.de/e/1392</a>            Det Norske Veritas  <a href="http://www.dnv.com/certification/climatechange/">www.dnv.com/certification/climatechange/</a></p>
Registries	<ul style="list-style-type: none"> <li>Collection of baseline and trend data</li> </ul>	<p><b>Carbon / Greenhouse Gases:</b>            California Climate Action Registry  <a href="http://www.climateregistry.org/">www.climateregistry.org/</a></p>
Policy Advocacy	<ul style="list-style-type: none"> <li>Advocacy for increased policy supports and incentives to engage in market-based approaches to environmental issues</li> </ul>	<p><b>Biodiversity:</b>            National Mitigation Banking Association  <a href="http://www.mitigationbanking.org/">www.mitigationbanking.org/</a></p>

In addition to the growth of service providers, many NGOs and global institutions are entering the field of environmental markets. Numerous NGOs are concerned about the inadequacy of current conservation funding and see environmental markets as offering another source of restoration and conservation revenue. Others are interested in ensuring that markets do not sink to ‘lowest common denominator’ solutions that will be ineffective when it comes to achieving conservation goals. A list of the major international organizations engaging with environmental markets is below and on the next page.

**Table 10:  
Major Organizations Working on Environmental Services Markets (Part 1)**

<b>Business and Biodiversity Offset Program (BBOP)</b>	A partnership—of companies, scientists, NGOs, government agencies, and research institutes—focused on offsets to ensure “no net loss” of biodiversity through conservation activities that will protect threatened habitat, contribute to national biodiversity strategies and address local communities’ livelihood priorities.
<b>Business for Social Responsibility (BSR)</b>	A business membership-based nonprofit that helps companies of all sizes and sectors to achieve success in ways that demonstrate respect for ethical values, people, communities and the environment. BSR’s Environmental Markets Initiative works with member companies on corporate risks and opportunities associated with these markets. BSR also offers advisory services and applied research on environmental markets as well as a wide range of other issues.
<b>Center for International Forestry Research (CIFOR)</b>	An international research and global knowledge institution committed to conserving forests and improving the livelihoods of people in the tropics. Conducts scientific research on environmental services and collaborates with partners to apply the research on the ground with policymakers.
<b>Commonwealth Scientific and Industrial Research Organization (CSIRO)</b>	Australia’s national science agency that has studied and valued environmental services and identifies opportunities for these values to be incorporated in land management policies, including through market mechanisms.
<b>Conservation International</b>	An international conservation organization that advocates for environmental service payments in field project sites. Also a partner in BBOP (see above) as well as Secretariat of the Climate, Community, and Biodiversity Alliance (CCBA), which provides voluntary standards to help design and identify land management projects that simultaneously minimize climate change, support sustainable development and conserve biodiversity.
<b>The Ecosystem Marketplace</b>	An information source on markets and payment schemes for ecosystem services; such as water quality, carbon sequestration and biodiversity. Provides solid and trust-worthy information on prices, regulation, science, and other market-relevant issues. A Marketwatch section tracks actual trades in land-based environmental markets, and original feature articles follow key developments and trends in the realm of market-based conservation.
<b>Forest Trends</b>	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. Forest Trends analyzes strategic market and policy issues, catalyzes connections between forward-looking producers, communities and investors, and develops new financial tools to help markets work for conservation and people.
<b>International Institute for Environmental and Development</b>	An international policy research institute and non-governmental body working for more sustainable and equitable global development, with various research projects on payments for ecosystem and watershed services.

**Table 10:  
Major Organizations Working on Environmental Services Markets (Part 2)**

<p><b>The World Conservation Union (IUCN)</b></p>	<p>A conservation network comprised of 83 States, 110 government agencies, and about 10,000 scientists and experts to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature. IUCN conducts research, writing, and focused initiatives related to payments for ecosystem services, including a partnership with WBCSD on various introductory materials to environmental markets, with a focus on biodiversity.</p>
<p><b>The Katoomba Group</b></p>	<p>An international working group composed of leading experts from forest and energy industries, research institutions, the financial world, and environmental NGOs dedicated to advancing markets for ecosystem services – such as watershed protection, biodiversity habitat, and carbon storage. The Katoomba Group seeks to address key challenges for developing markets for ecosystem services, from enabling legislation to establishing new market institutions, to developing strategies for pricing and marketing, and monitoring performance. The Group builds on the knowledge and experience of network members who attend international convenings.</p>
<p><b>The Natural Capital Project</b></p>	<p>A joint venture between WWF, Stanford University, and The Nature Conservancy on developing new tools to incorporate the values of ecosystem services in decision-making, including maps of natural capital and launching an international network of projects that apply understanding of natural assets and ecosystem services to land-use and investment decisions. The Natural Capital Project seeks to magnify the impact of these on-the-ground projects by engaging decision-makers, from local leaders to government officials to financial professionals.</p>
<p><b>The Nature Conservancy</b></p>	<p>A conservation organization that supports conservation projects that develop ecosystem service payments, especially for watershed protection and carbon offsetting.</p>
<p><b>Winrock International</b></p>	<p>An international leader in the development of terrestrial / land-based carbon sequestration measurement and monitoring protocols.</p>
<p><b>World Bank</b></p>	<p>A source of financial and technical assistance to developing countries around the world. Conducting research on payments for ecosystem service and has established a BioCarbon Fund that finances pilot carbon sequestration projects, including through forest conservation and agroforestry, while aiming to reduce rural poverty and increase sustainable management of local ecosystems.</p>
<p><b>World Business Council for Sustainable Development (WBCSD)</b></p>	<p>A CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development. WBCSD is developing and testing a methodology that would enable companies to better understand their ecosystems impacts, dependency, liabilities and assets, and respond appropriately. Partners include: WRI, IUCN, Meridian Institute.</p>
<p><b>World Resources Institute (WRI)</b></p>	<p>An environmental think tank that goes beyond research to find practical ways to protect the earth and improve people’s lives. Co-developing and road testing a corporate “ecosystem services review” methodology with the Meridian Institute and the WBCSD (see above). Also creating NutrientNet that is intended to enable water-related markets.</p>
<p><b>World Wildlife Fund (WWF)</b></p>	<p>An international conservation organization that includes work on assessing ecosystem services and flows, through The Natural Capital Project partnership and other initiatives. WWF is also promoting policies and payment mechanisms, by working with local, national and international partners to create markets for ecosystem services (with CARE and IIED). Exploring applicability at project sites services and reaching out to private sector players.</p>

## Cases

The following cases were selected to show the range of ways in which environmental markets and business-to-business deals associated with environmental services are emerging. The intention in presenting these cases is to spur questions around opportunities and risks associated with markets and payments. The cases and key points include:

- Carbon market engagement through land use-based investments such as forestry, either on corporate lands (in which the company would be a ‘seller’) or on lands in key operating regions that offer strong reputation and brand enhancement opportunities;
- Payments for watershed services which offer the opportunity to address water quality, and potentially water availability, while concurrently generating local community and regulatory goodwill, and
- Conservation and mitigation banking in the U.S., and recent new approaches in Australia, that may offer ways to transition real estate liabilities into new revenue streams.

### A. Carbon Market Engagement through Land Use-based Investments<sup>71</sup>

As companies craft climate change strategies, corporate decision-makers will increasingly encounter the question of whether to invest in carbon sequestration through forestry and land use initiatives (referred to here as bio-carbon initiatives). Deforestation and land degradation are responsible for about 20% of global carbon emissions,<sup>72</sup> and are therefore a growing focus of international climate policy discussion. Scientists have long pointed to the critical role of land use, land use change and forestry in addressing and mitigating climate change, and discussion about the use of market-based incentives to encourage good practice has been building for some time.

At present, one of the most popular programs that companies are engaged in involve planting trees. However, fewer businesses have considered the full set of investment options, which include expanding and improving managed forest initiatives, changing land management or agricultural practices to enhance soil carbon sequestration, and addressing deforestation, thus preventing greenhouse gas emissions that occur when forests are cleared.

For many companies, two opportunities exist in this domain. The first is relevant to businesses with large holdings, on which manager’s can explore being a ‘seller’ of carbon sequestration—through tree planting or averting carbon-releasing activities on lands currently sequestering carbon, such as in the form of forests and peatlands. The second option is to become a ‘buyer’ of ‘bio-carbon’ in regions that are important to the company. Such ‘bio-carbon’ projects have the potential to reap multiple dividends if they follow protocols to ensure that they benefit not only climate through carbon sequestration, but also the local community and biodiversity (see Climate, Community and Biodiversity Standards (CCBS)).

As companies consider this domain, it is essential to think through potential risks and challenges, particularly associated with avoided deforestation remain which include:<sup>73</sup>

- **Establishing accurate ‘baselines’ for reduced deforestation** to ensure that ‘additional’ reductions in deforestation are underway, that would not have occurred without a new investment;
- **Ensuring against ‘leakage’** or that avoided deforestation in one location does not shift deforesting another area;
- **Assuring permanence** in light of risks such as fire and management issues;
- **Guaranteeing against ‘double-counting’** so that credits are only issued for a particular area once;
- **Pricing** in order to account for the true costs for conserving forests and other habitats with carbon storage potential;

- **Agreeing on the flow of benefits** in such a way that is both clear about the rights and responsibilities of landowners and local resource users and also factors in concerns both between buyers and sellers as well as within local communities, and
- **Taking into account community-level, regional, and national priorities** such as interest in using land for food production.

These issues mean that companies should carefully explore land use based projects in a multi-faceted fashion prior to engagement. The potential upsides may be well worth the effort, reputationally as well as garnering regulatory goodwill, both of which could result in winning new projects over time. These bio-carbon-related issues will be a key subject for discussion at the United Nations Conference of the Parties (COP) in Bali during December 2007, which will provide the legal framework and government endorsement for the concept, if it goes ahead. (For more information on bio-carbon, please see BSR's Business Brief entitled: "Bio-Carbon and Corporate Climate Strategy" at [www.bsr.org](http://www.bsr.org).)

## Illustrative Cases

In Brazil, the American Electric Power Corporation, Chevron and General Motors have paid \$18.4 million for climate credits with the Guaraqueçaba Climate Action Project (GCAP). The GCAP has sought to regenerate and restore natural forest and pastureland, and it sells carbon emission offset credits for the 8.4 million metric tons of carbon dioxide the restoration project is expected to sequester in its lifetime. Thus far, the project is demonstrating ecological and economic benefits locally while helping the companies to mitigate their carbon risk.

In Uganda, Tetrapak has purchased about \$100,000 worth of carbon emissions credits that pay individual farmers to plant indigenous tree species. The payments are channeled through an international carbon broker and a Ugandan national conservation trust. Thus far, over 100 farmers have been paid to participate.<sup>75</sup>

In Mexico, the Scolel Té project<sup>76</sup> offers a way for companies to offset emission by investing in agricultural and forestry projects. The International Federation of Automobiles used this initiative to offset emissions. Their funds were used for technical assistance to, and forestry supplies for, small-scale farmers that enables switching from swidden agriculture to agroforestry. Project management is undertaken by the Edinburgh Centre for Carbon Management and a co-operative of foresters and agronomists in Mexico (AMBIO).

### **B. Payments for Watershed Services: New York City's Payments in the Catskills**

The case of New York City's Catskill watershed protection program shows how a large water user found that the most cost effective approach to maintaining drinking water quality was through an ecosystem services strategy. Implementation of this approach was paid for through pollution prevention cost savings. The initiative overcame the traditional resistance to pollution control through making it economically beneficial to local landowners and businesses to engage.

For industrial users of water and municipal water systems, the take-away message is one of examining the relative costs and multiple benefits of investing in ecological system-based approaches to water quality protection and filtration rather than using traditional industrial facility approaches.

#### **Case Background and Details**

In 1986, the United States Congress, concerned about outbreaks of giardia and cryptosporidium in unfiltered water systems, passed the Safe Drinking Water Act, which gave all surface water drinking systems serving more than 10,000 people until 1993 to build filtration works to protect public health.

A narrow exception, called an avoidance, was established for currently unfiltered systems that could demonstrate adequate long-term control over their watershed and a comprehensive plan to protect it. Given that watershed protection programs had generally failed due to local resistance to regulation of non-point source pollution, it was expected that all surface water systems would ultimately have to filter.

New York City had the largest unfiltered water system in the world, drawing from a Catskill mountain watershed the size of the State of Delaware. The cost of filtering such a system was estimated at \$4 – 6 billion in infrastructural investments as well as \$200 - \$300 million a year in operational costs. Faced with these figures, New York City's Dinkins Administration asked the question, would it not be cheaper and more beneficial to prevent pollution, rather than spend so much more money to clean it up.

Resistance to this proposal emerged quickly. Government agencies were accustomed to top down environmental regulation. Local stakeholders believed that effective water quality protection would economically destroy Catskill farming and other local economic activities. Public health experts derided watershed protection as a nice idea on paper that had not and would not work in practice.

However, under the leadership of New York City's Dickens Administration's Department of Environmental Protection Commissioner Albert Appleton, the City broke from the heavy handed and ineffectual regulatory strategies of the past. Stakeholder consultation was established with local farmers that led to the "Whole Farm Watershed Protection Partnership" under which Catskill farmers received major economic benefits in exchange for carrying out locally-based but comprehensive programs of agricultural pollution control. The result was drastically reducing non-point source pollution and eliminating the pathogen threat to drinking water safety, while helping to preserve the economic viability of farming in the Catskills.

Building on this success, the City then expanded its consultation process to where it ultimately encompassed 60 towns, seven counties, numerous environmental groups and a comprehensive range of state and Federal agencies. The effect was a comprehensive watershed protection program that committed over \$1 billion over ten years (a fraction of the cost of filtration) to retooled traditional pollution clean-up facilities and new partnership programs, including acquisition of undeveloped land and mutual efforts to promote water quality compatible with development in the Catskills.

Starting with an avoidance grant in 1991, these programs have earned New York an ongoing series of avoidance determinations, including one in early 2007 that will run through 2017. The overall benefit is one of saving the City billions of dollars while using some of those savings to equally benefit Catskill residents and the Catskill ecosystem.

### **C. Conservation and Mitigation Banking in the U.S.**

The concept of providing financial returns for habitat protection is increasingly being applied, particularly in the U.S. For example, species conservation banking—which includes trading credits for endangered species habitat—has been practiced for over a decade in the U.S. A 2005 study found 35 properties that were U.S. Fish and Wildlife Service approved 'conservation banks,' spanning across almost 16,000 hectares and protecting habitat for over 22 species listed under the U.S. Endangered Species Act. The majority of these banks were created with financial motives and were 'in the black' as credit prices—ranging from \$3,000 to \$125,000 per acre—presented a competitive land use option.<sup>78</sup>

Another example, also from the U.S., was stimulated by the U.S. Clean Water Act and is called wetlands mitigation banking. Even while the legal nuances of the regulation are undergoing scrutiny in the Supreme Court,<sup>79</sup> parties are brokering deals at hundreds of banks across 40 states, with total sales estimated to be worth \$1 billion per annum.<sup>80</sup> These wetland banks are focused on creation of wetlands that compensate from development-related losses of wetlands.

### Case Details<sup>81</sup>

Chevron transformed a tapped out 7,102 acre property in Paradis, Louisiana into \$150 million in wetland mitigation credits. The company considered a variety of options, from building homes to selling the land—all limited by the fact that the property's elevation averaged six feet below sea level and was too weak to support structures. The land could, however, function as a wetland mitigation bank through planting trees and digging culverts, which offers stormwater storage, sediment control, water filtration, and carbon sequestration.

The project, though, has critics. Some question how assertions of permanence can be made on a below-sea-level wetland located in a hurricane prone area. During the design phase, some effort was taken to address issues, including the Army Corps of Engineers limitation place on selling the credits only within other levee-protected, below-sea-level areas.

For Chevron, the deal has led to a series of benefits, including: (1) “predictable mitigation costs,” (2) “no conservation servitude” in the form of further land use restrictions, and (3) “no long term maintenance or monitoring.”<sup>82</sup>

## Recommended Readings

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### B. Overviews and Analyses

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## Appendix A: Interviewees & Peer Reviewers

Last Name	First Name	Organization
<b>Environmental Service Markets</b>		
Allenby	Braden	Arizona State University
Bayon	Ricardo	Ecosystem Marketplace
Dushku	Aaron	Winrock International
Gentry	Bradford	Yale University School of Forestry & Environmental Studies
Griffiths	James	World Business Council on Sustainable Development
Manale	Andy	National Center for Environmental Economics, U.S. EPA
Morris	Belinda	The Nature Conservancy and The Natural Capital Project
Raffle	Brad	Conservation Capital, LLC
Ranganathan	Janet	World Resources Institute
Reichenbach	Stefan	Reuters
Vitale	Ben	Conservation International
<b>Carbon</b>		
Brand	David	New Forests Pty Limited
Hamilton	Kate	Ecosystem Marketplace
Hannon	Allison	The Climate Group
Janson-Smith	Toby	The Climate Community & Biodiversity Alliance
Rau	Alex	Climate Wedge
Walsh	Michael	Chicago Climate Exchange
<b>Water</b>		
Appleton	Al	Independent Consultant on Payments for Watershed Services
Asquith	Nigel	EcoFondo
Echavarria	Marta	Independent Consultant on Payments for Watershed Services
Gutman	Pablo	WWF
Haden	Eva	World Business Council for Sustainable Development
Postal	Sandra	The Global Water Project
Thompson	Jacob	WaterWise
<b>Biodiversity</b>		
Bishop	Josh	IUCN
Davis	Adam	Solano Partners
Denisoff	Craig	National Mitigation Banking Association
Grigg	Annelisa	Flora & Fauna International
Melnick	Don	Center for Environmental Research & Conservation at Columbia University
ten Kate	Kerry	Business and Biodiversity Offset Program
Windhager	Steve	Lady Bird Johnson Wildflower Center at University of Texas, Austin
Venhaus	Heather	

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