



**ECOSYSTEM SERVICES MANAGEMENT:
A BRIEFING ON RELEVANT PUBLIC POLICY DEVELOPMENTS AND EMERGING TOOLS**

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on behalf of Fauna & Flora International



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Fauna & Flora International

Fauna & Flora International (FFI) is the world’s first established international conservation body, founded in 1903. FFI acts to conserve threatened species and ecosystems worldwide, choosing solutions that are sustainable, are based on sound science and take account of human needs. Through its Global Corporate Partnership Programme, FFI aspires to create an environment where business has a long term positive impact on biodiversity conservation.

I. Introduction

If your company had real estate liabilities that could be turned into assets, would your senior executives consider action? If your firm could tap into new revenue sources that might cover the costs of this transition from liability to assets, what implications would it have on prioritizing action? And if, in the process, your business could create a good marketing story that speaks to core values—around clean air, green neighbourhoods, and healthy children—how would you see this opportunity?

This nexus of liabilities, incentives, and marketing potential is not a distant future scenario. Emerging regulatory and voluntary environmental markets are bringing these three elements together in ways that hold promise for companies to become restorers of ecological systems—and the operational infrastructure that functioning ecosystems represent for businesses and communities alike.

This convergence means that ecological restoration is becoming relevant to corporate strategy, particularly for companies with large land holdings and/or reliance on direct access to natural resources. For example, opportunities now exist for land-intensive industries like electricity, mining, oil and gas, food and agriculture, and timber as well as consumer products and technology industries reliant on clean water, relatively predictable climates, and healthy employees, to differentiate themselves in a competitive market place, protect against rising operational costs and secure continued access to finance.

Based upon current trends, it appears increasingly likely that corporate investments in ecological infrastructure will become core strategies for leadership companies within the next five years.

A. Drivers of the Escalating Momentum around Ecosystem Services

Climate change and water are rising to the top of policy and scientific agendas. The Stern report, IPCC reports, Millennium Ecosystem Assessment, and G8+5 review of the Economics of Ecosystems & Biodiversity, to name just a few, represent unprecedented levels of global scientific consensus around climate change, water, and biodiversity concerns. Not only is the degradation of ecosystems increasingly well documented, but their essential role in providing services for businesses is increasingly recognized. Clean and reliable quantities of water. Healthy, non-polluted air. Ongoing flows of resources derived from resilient natural systems. Relatively predictable weather. As a set, these elements provide the often invisible, but essential elements of corporate operating infrastructure.



The essential role played by biodiversity in providing services to business is increasingly recognised

As these ecological systems become more and more disturbed, the potential for severe economic disruptions is clear. For example, given climate change, scientists predict that climatic disruptions will become more frequent and severity of storms amplified by dismantled ecological systems. To take one example, numerous studies showed that the multi-billion dollar price tag of Hurricane Katrina in the U.S. would have been significantly reduced if coastal wetlands in the Gulf States had been preserved.^[1]

In response, the concept of ecosystem services (also referred to as 'environmental services') is gaining advocates among academics, leading NGOs, and even individuals within regulatory agencies—in countries around the world. The 2005 Millennium Ecosystem Assessment was a milestone publication in this regard, which signalled a critical mass of ~1,300 scientists from 95 countries around the world attesting not only to the importance of these services but also to the seriousness of current trends. Specifically, the study found that 60% to 70% of ecosystem services globally are being degraded more quickly than they can recover. The overarching message was that greater attention had to be paid to these "services" which natural ecological systems provide to society.

Yet, many in the private sector may ask why should a business – which already pays to meet air and water pollution regulations and other guidelines, as well as to gain services from a local or regional water utility – suddenly start paying for ecosystem services? More pointedly, why would individual businesses pay for the maintenance of well-functioning ecosystems when everyone relies upon them?

The first answer revolves around risk mitigation. In an environment of unpredictable weather, shifting rainfall, water shortages, and clean technology, the most nimble and risk-aware companies are those that will excel. And the possibilities for corporate restoration of private lands, as a risk mitigation strategy, are intriguing—particularly if these are occurring within the context of emergent public policy that a company can show leadership on and thus in part shape.



60% to 70% of ecosystem services globally are being degraded more quickly than they can recover

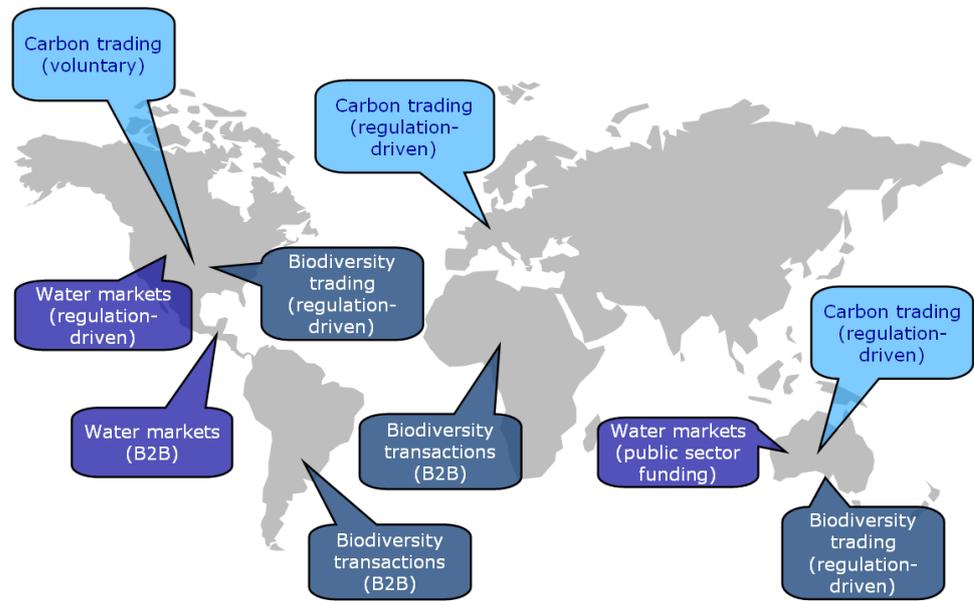
The second answer is that policy makers are beginning to incorporate ecosystem services principles into policy dialogues and new legislation. Today, ecological investment vehicles are proliferating in the form of carbon markets, self-organized watershed restoration deals, and biodiversity impact offsets. A mix of regulatory and voluntary markets now trade at multi-billion dollar levels in environmental derivatives of carbon sequestration, water-quality improvements and biodiversity conservation^[ii]. In addition, companies that are reliant upon particular ecosystem services are engaging in focused business deals and payments for ecosystem services (PES) on a local level.

For corporate strategists, the question is whether—in a context of carbon caps and water scarcity—companies can leverage investments in ecosystem services to minimize the associated risks to their supply chains, costs of raw materials, and dampening effect on growth markets. In the absence of a co-ordinated approach from governments on these shared resources, failure to pro-actively manage them may lead to rapidly spiralling costs.

Despite these trends, the reality is that the field is still very much emergent—rife with regulatory uncertainty and a historical lack of decision-making tools that make it challenging for companies to explore with confidence. This briefing aims to provide companies with a snapshot of the current ‘state of play’ on policy and tool development.

II. Regional Policy Trends

Policy makers around the world are exploring ecosystem services concepts—including environmental markets and payments for ecosystem services (PES). Most prominent among these experiments is the monetization of greenhouse gas emissions -- an effort to economically reflect the relative scarcity in carbon sequestration capacity. Yet the exploration does not end with carbon and greenhouse gases. Rather, around the world there are policy-based experiments around maintenance of water quality and availability, soil fertility and areas of high biodiversity (see map for highlights).



In Europe, the European Commission and Environment Ministry of Germany has launched a major initiative following a call for action by the G8+5 environment ministers in Potsdam in 2007. The Economics of Ecosystems and Biodiversity study will, among other things, explore robust valuation toolkits in support of future policy development. An interim report was published in May 2008 and a final report will be presented at the Convention of Biological Diversity Conference of the Parties in 2010^[iii]. The findings of this report are likely to shape European policy in this area.

In the U.S., the Environmental Protection Agency's Office of Research & Development has reconfigured its program to reflect an ecosystems approach^[iv] and is sponsoring numerous conferences and workshops to stimulate new research as input to policy design.

In Latin America, Brazil and Costa Rica have been leading the way in implementing national Payments for Ecosystem Services policy regimes, with a particular focus on forest-based carbon and biodiversity protection^[v].

In Asia, China has been quietly experimenting with payments for watershed services^[vi], and Vietnam recently became the first Southeast Asian country to implement a national Payments for Ecosystem Services system^[vii].

III. Policy Trends by Environmental Asset

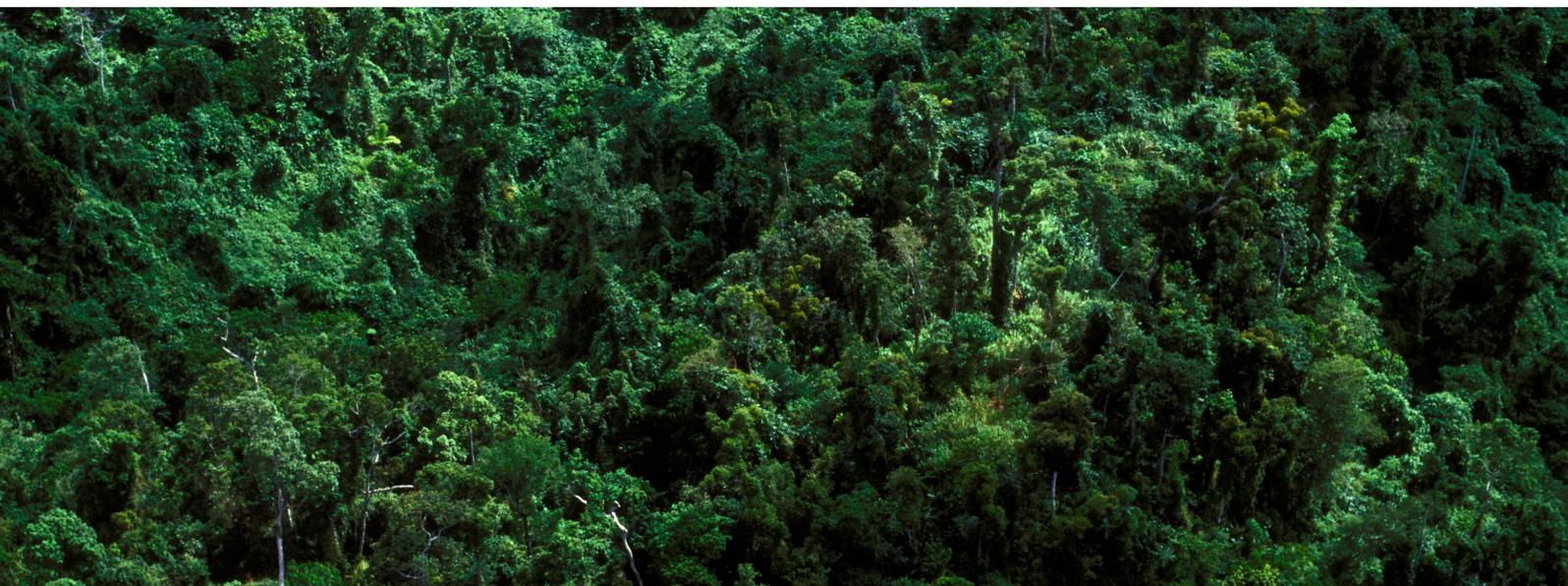
Due to the systemic nature of ecosystem services, the policies do not fit neatly into one category (or regulatory agency), but for the sake of this paper, we will classify them as a) air emissions, b) water quality and quantity, and c) biodiversity habitat.

10-20% of grassland and forest are projected to be converted to agriculture between 2000 and 2050



A. Air Emissions

While market-based mechanisms have historically been applied to everything from fish stocks to municipal waste, they have grown most prominently in air emissions. Dating back to the 1990s U.S. cap-and-trade system in sulphur dioxide, various treaties and regional policies have launched a new generation of markets in a basket of air emissions: greenhouse gases.



Markets are emerging for carbon credits generated from the reduction of emissions from deforestation and degradation

Greenhouse gas markets, which are intrinsically about valuing the ecosystem service of carbon sequestration, have grown to a trading volume of USD64 billion in 2007^[viii]. The vast majority of this trading occurred in compliance markets under the Kyoto Protocol, European Union Emissions Trading Scheme, and New South Wales GHG Reduction Scheme, but over-the-counter deals and trading via voluntary markets in the US experienced steep growth as well.

Table 1. Landmark Air Emissions Policies and Markets

Landmark Policies	Regional greenhouse gas reduction targets: <u>Kyoto Protocol to the UN Framework Convention on Climate Change</u> <u>California's Global Warming Solutions Act of 2006</u> <u>Australia's New South Wales Greenhouse Gas Reduction Scheme</u>
Compliance Markets	Existing market-based air emissions trading schemes: <u>Kyoto Protocol Mechanisms</u> <u>European Union's Emission Trading Scheme</u> <u>Australia's New South Wales Greenhouse Gas Reduction Scheme</u>
	Emerging market-based air emissions trading schemes: <u>Regional Greenhouse Gas Initiative (U.S.)</u> <u>Western Climate Initiative (U.S.)</u> <u>Australia's National Emissions Trading Task Force</u>
Voluntary Markets	Voluntary market-based air emissions trading schemes: <u>Chicago Climate Exchange</u> <u>Australian Climate Exchange</u> <u>Japanese Voluntary Emissions Trading Scheme</u>

The valuation and trading thus far has focused on industrial and transport emissions, but a trend to watch is the untapped potential for “reducing emissions from deforestation and ecosystem degradation” (REDD). With deforestation and ecological degradation accounting for roughly one quarter of global greenhouse gas emissions, land use considerations are clearly a large piece of the climate change puzzle. They also offer a portfolio of socio-economic and environmental “co-benefits”, including resilience to climatic change. Yet, REDD is also highly complex. The value of forest sequestration has also traditionally been harder to quantify and lacks the influential lobby groups advocating for engineered solutions to climate change^[ix].

As modelling and valuation tools emerge, such as the ones discussed in the section on tools, they may level the playing field between engineered and ecological solutions to the climate change puzzle. Countries that have been more pro-active on deforestation efforts will only become more vocal about the need for recognition of these projects under a post-Kyoto climate regime^[x]. As a precursor, we are beginning to see increased demand for over-the-counter REDD projects (accounting for roughly 36% of total voluntary transactions^[xi]), increasing recognition under sub-national schemes (e.g. California Climate Action Registry’s Forest Protocol^[xii]), and increasing acknowledgment at the national and global policy dialogues (e.g. Boxer-Lieberman-Warner Climate Security Act in the U.S.^[xiii] and the Forest Carbon Dialogue at the international Conference of the Parties^[xiv]). Country level analyses such as the forthcoming Eliasch Review^[xv] (commissioned by the UK Prime Minister as a follow-up to the seminal 2006 Stern Review, and focussing on the global environmental and economic costs of forest loss) will only increase the level of attention paid to REDD.

B. Water Quality & Quantity

There is growing consensus within the scientific community that climatic changes will shift – and make more unpredictable – long-standing patterns of precipitation and groundwater recharge. In certain regions, this will lead to prolonged drought and water shortages,^[xvi] particularly in already arid and semi-arid environments. In other regions, this will lead to excessive amounts of water, as vividly illustrated in the 2007 flooding of parts of North Korea and South Asia. In addition, water quality concerns exist, that range from pollution, such as contaminated water sources for 90% of the cities in China,^[xvii] through industrial and community pollutants that lead to eutrophication and hypoxia which can fundamentally shift environmental systems and lower water quality.^[xviii]



Water demand will double or triple within the next 50 years in developing countries

These trends are of particular concern in light of projections that water demand will double or triple within the next 50 years in developing countries given increasing needs for both electricity and drinking water.^[xix] With demand outstripping supply, many regions are experiencing a growing annual water deficit,^[xx] affecting hydropower production, agricultural yields, and constraints to industrial expansion,^[xxi] along with more general detriment to local ecosystems.

Unlike the gradual effects of global climate change, water challenges tend to be acute and regional in nature. As such, they often lead to intense pressure for immediate political action,^[xxii] sometimes targeted at industrial or corporate water users.^[xxiii] This makes it ever more likely that water-related markets and payments for watershed services will continue to appear across the globe, and ever more likely that companies will need to set watershed services firmly on the risk radar screen.^[xxiv] The role of natural ecosystems in preserving these services is increasingly well documented and some of the deals that are emerging to protect forests in order to reduce greenhouse gas emissions from deforestation are also placing a value on watershed services.

Experimentation with water-related policies, which have valuation implications, is already underway, as laid out in the table below.

Table 2. Landmark Water Quality Policies and Markets

<p>Landmark Policies</p>	<p><u>European Union Water Framework Directive</u> <u>Costa Rica’s Forest Law 7575 – Payments for Environmental services program</u> <u>China’s Sloping Land Conversion Program</u> <u>China’s Forest Ecosystem Compensation Fund</u> <u>U.S. Clean Water Act</u></p>
<p>Compliance Markets</p>	<p><u>U.S. Water Quality Trading</u> <u>U.S. Wetlands Mitigation Banking</u> <u>U.S. Nutrient Trading Programs</u> <u>Australian State Forests of New South Wales’ Reduction of Water Salinity Program</u></p>
<p>Voluntary Markets</p>	<p><u>Costa Rica’s Environmental Services Payment Program</u> <u>Mexico’s Payments for Hydrological Services</u></p>

C. Biodiversity

While biodiversity^[xxv] itself is not an environmental service, it is an essential component of maintaining the structure, function and resilience of ecological systems. So as biodiversity diminishes, it has knock-on effects on other ecosystem services, including water filtration, erosion control, food production, and carbon sequestration. Therefore, while biodiversity per se may not have immediate financial value to all sectors, the services it underpins often do.^[xxvi]

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The trend towards biodiversity protection as a private sector activity is an emerging one, but there are signals of increasing legal liabilities and an increasing burden of proof for biodiversity protection.^[xxvii] This is of direct relevance to companies with natural resources-based inputs or those sitting in greenfield sites. In many cases, the growing legal and permitting risks are a result of new and creative applications of historical laws (e.g. the EU Liability Directive and Safe Harbor Agreements under the U.S. Endangered Species Act^[xxviii]). The latter – like many of the emerging schemes - employs the concept of “banking”, which allocates credits for actions that preserve, enhance or restore lands.^[xxix] These credits can then be used to preserve or restore ecologically equivalent land elsewhere. Noteworthy, however, is that few of these efforts seek to place a monetary value on biodiversity assets in a specific location and instead rely on average values or ecological equivalency guidelines.

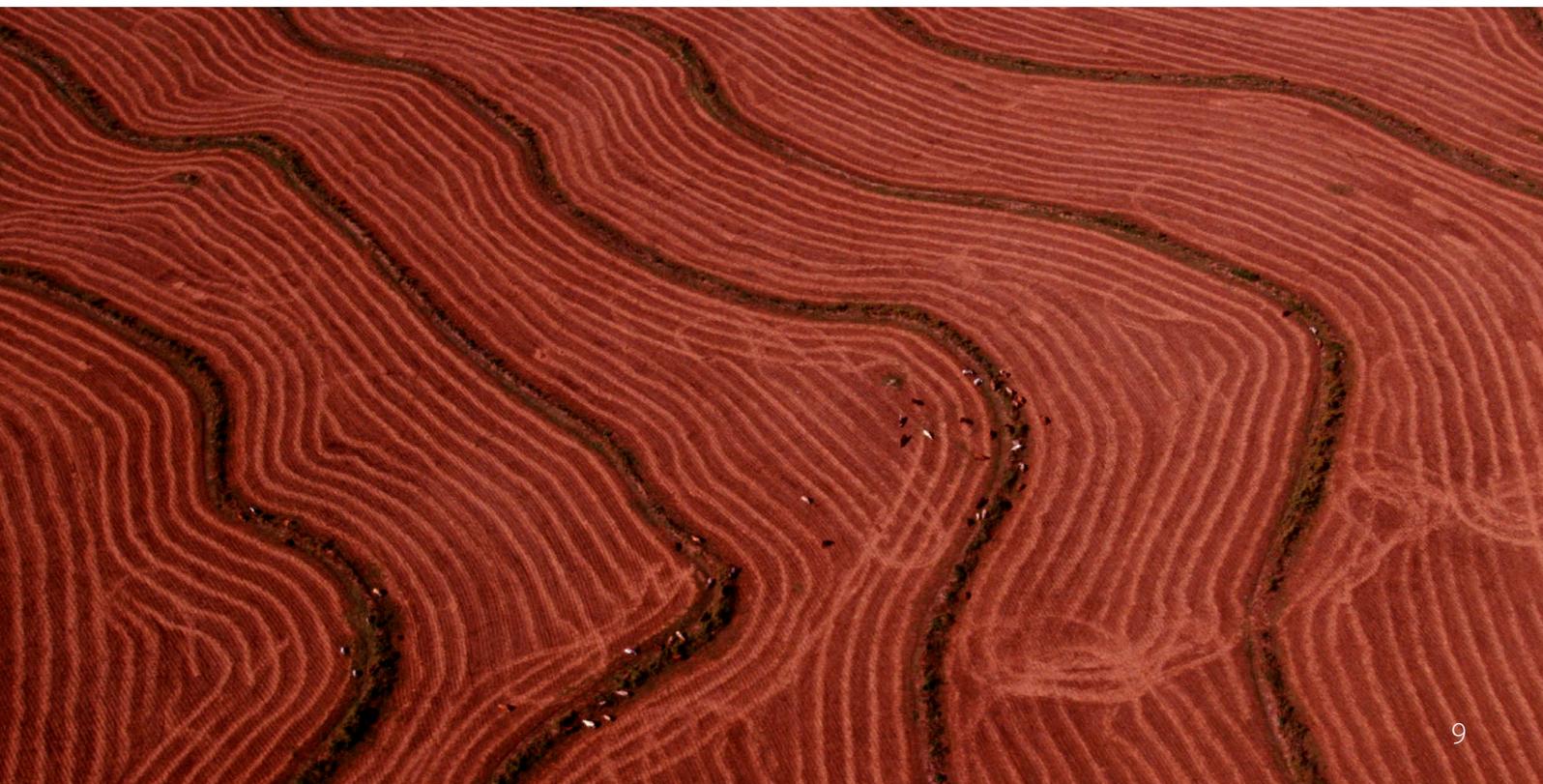
Table 3. Landmark Biodiversity Policies and Markets

<p>Landmark Policies</p>	<p><u>U.S. Endangered Species Act (i.e. Conservation Banking)</u> <u>European Union’s Habitats Directive</u> <u>European Union’s Birds Directive</u> <u>Brazil’s Tradable Forest Conservation Obligations under the Forest Regulation and National System of Conservation</u> <u>Switzerland’s Federal Law for the Protection of Nature and Landscape</u> <u>Australia’s New South Wales Green Offsets Scheme</u> <u>Netherlands Biodiversity Offsets Program</u></p>
<p>Compliance Markets</p>	<p><u>U.S. Conservation Banking</u> <u>U.S. Wetland Mitigation Banking</u> <u>Australia’s BioBanking</u></p>

IV. Emerging Tools for Corporate Ecosystem Services Management

These growing efforts around environmental markets, PES, and other policy changes to include environmental services imply that companies will need to understand their dependencies and impacts on ecosystem services. In response, over the past few years, academics, non-governmental organizations (NGOs), and public sector research entities have been quietly developing tools to enable key decision-makers—in public, private, and non-profit sectors—to integrate ecosystem service concepts into planning as well as daily operations. The growing number of initiatives can make it challenging to sort out which tools are applicable at which decision-making juncture; which rely on robust analytical methods and high quality data; and which might be used in concert with other decision-making tools.

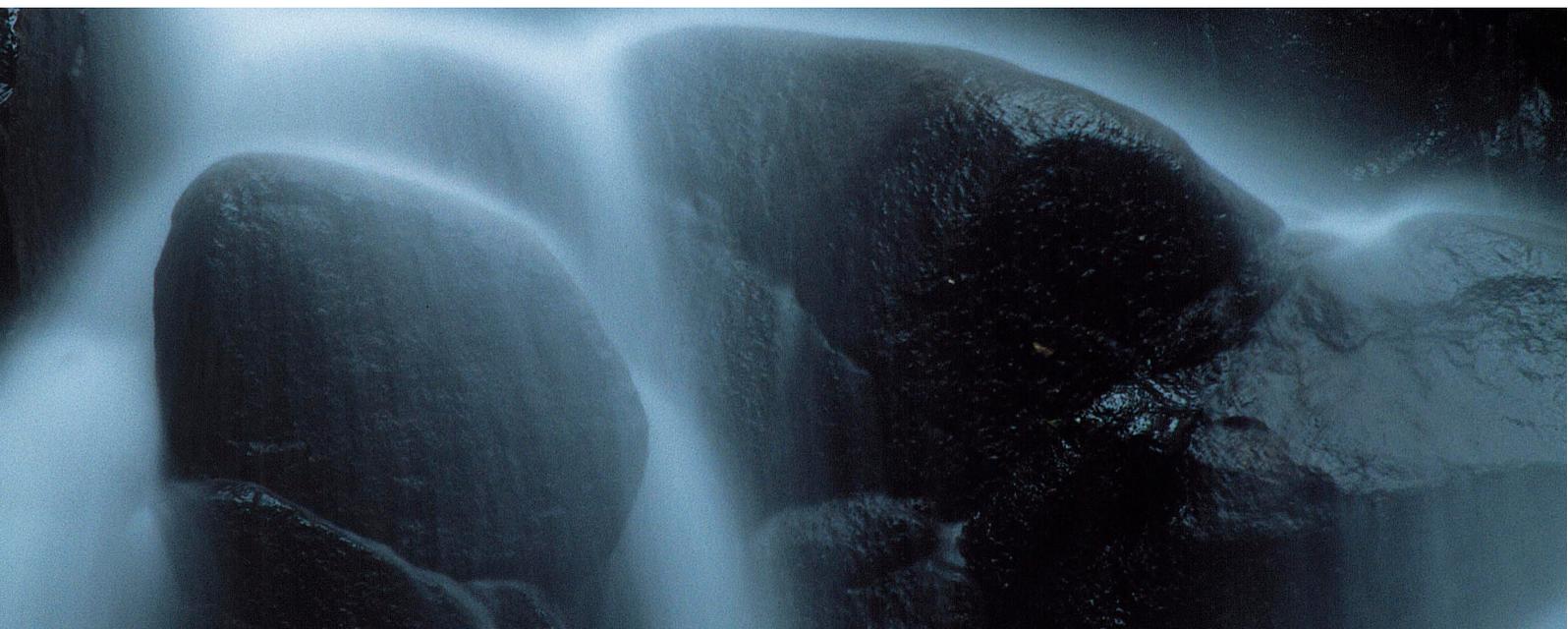
Cultivated land now covers one quarter of the world’s land area



A. Multi-Ecosystem Service Assessment Tools

There is now a set of emergent tools for conducting multiple environmental service-focused assessments, including:

- **ARIES (Assessment and Research Infrastructure for Ecosystem Services)**, which is under development by the University of Vermont's Ecoinformatics "Collaboratory" (at the Gund Institute for Ecological Economics), Conservation International, Earth Economics, and experts at Wageningen University.
- **ESR (Corporate Ecosystem Services Review)**, which was launched in March 2008 by the World Resources Institute (WRI), the Meridian Institute, and the World Business Council on Sustainable Development (WBCSD).
- **InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs)**, which is in development by The Natural Capital Project—a joint venture among Stanford University's Woods Institute for the Environment, The Nature Conservancy, and World Wildlife Fund—with the goal of issuing a manual in the Summer / Fall 2008 and software in Fall / Winter 2008.
- **MIMES (Multiscale Integrated Models of Ecosystem Services)**, which is currently available in an early version ("beta plus") from the University of Vermont's Gund Institute for Ecological Economics.
- **NVI (Natural Value Initiative) assessment approach**, which is being created by Fauna & Flora International, Brazilian business school FGV, and the United Nations Environment Program's Finance Initiative for the financial sector.



Deals are emerging that place a financial value on watershed services

B. Biodiversity focused tools linked to ecosystem services

In addition to these tools focused on multiple ecosystem services, a number of other tools exist—or are in development—that are also relevant given (a) the role of biodiversity in ecosystem structure and function, and (b) the broader range of environmental parameters being considered, which include elements of ecosystem services. These other relevant assessment approaches—which are in various stages of development—include:

- **BBOP (Business and Biodiversity Offset Program) Toolkit**, which is in development by Forest Trends, Conservation International and the Wildlife Conservation Society—along with a set of pilot testing companies and a multi-sectoral advisory committee as well as a "learning network"—that would in turn be used to inform design of a biodiversity offset approach.
- **IBAT (Integrative Biodiversity Assessment Tool)**, which is in development by Conservation International, following on their "Initial Biodiversity Assessment & Planning" (IBAP) approach that draws on Rapid Ecological Assessment methodologies and aims to enable companies to identify potential site specific impacts and risks associated with biodiversity.

Table 4: Side-by-Side Overview of Ecosystem Service Assessment Tools

	Description	Intended Users	Salient Features
Multi-Ecosystem Service Assessment Tools			
Assessment and Research Infrastructure for Ecosystem Services (ARIES)	A modelling program to help with decision-making by quantifying environmental assets and factors influencing their values, in a geographical area and according to needs and priorities set by its users.	<ul style="list-style-type: none"> • Policy makers • NGOs • Consultants • Companies 	<ul style="list-style-type: none"> • Designed for “artificial intelligence” to users on assessment and valuation • Transparent, so users know information sources • “Non-deterministic model” that allows use of whatever data exists • User-friendly interface despite complexity of model
Corporate Ecosystem Services Review (ESR)	A sequence of questions that helps managers develop strategies to manage risks and opportunities arising from their company’s dependence on ecosystems.	<ul style="list-style-type: none"> • Corporate managers 	<ul style="list-style-type: none"> • Offers a methodical, logical sequence of questions • Can be applied as a separate process or integrated into existing Environmental Management Systems • Fuses environmental data with corporate strategy • Most advanced in terms of “road-testing” with companies
Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST)	A decision-making aid to assess how distinct scenarios might lead to different ecosystem service and human well-being related outcomes in particular geographic areas.	<ul style="list-style-type: none"> • Government agencies • Farmers and individual landowners 	<ul style="list-style-type: none"> • Enables users to input their own site-specific data • Allows for expert opinion as data to address data gaps • Enables consideration of present and future tradeoffs • User-friendly with few data requirements
Multi-scale Integrated Models of Ecosystem Services (MIMES)	A multi-scale, integrated suite of models that assess the true value of ecosystem services, their linkages to human welfare, and how their function and value might change under various management scenarios.	<ul style="list-style-type: none"> • Scientists • Policy makers • Natural resource managers 	<ul style="list-style-type: none"> • Value can be denominated in dollars, land area, or other parameters • Offers a general, multi-scale framework applicable globally • Is already populated with reliable, publicly available data • Can be scaled for additional data input • Model is open source, has successfully run
Natural Value Initiative (NVI)	An evaluation methodology for assessing biodiversity and ecosystem-services related risks and opportunities in the food, beverage and tobacco sectors.	<ul style="list-style-type: none"> • Corporate managers • Financial analysts 	<ul style="list-style-type: none"> • Promotes greater awareness within the finance sector of (a) the business case for managing impacts on biodiversity and ecosystem services, and (b) the risks associated with mismanagement of resources • Provides both guidance and case studies • Uniquely tailored to the needs of the finance sector • Creates a risk profile based on both publicly available information and direct corporate engagement

Table 5: Side-by-Side Overview of Biodiversity Assessment Tools linked to Ecosystem Services

	Description	Intended Users	Salient Features
Biodiversity focused tools linked to ecosystem services			
Business & Biodiversity Offset Programme (BBOP)	A toolkit for assessing whether or not biodiversity offsets are appropriate and providing guidance on design of these offsets.	<ul style="list-style-type: none"> Corporate managers 	<ul style="list-style-type: none"> Flexible, due to emphasis on qualitative key questions Designed to eventually mesh with Environmental Impact Assessments
Integrated Biodiversity Assessment Tool (IBAT)	A methodology that helps companies incorporate biodiversity into their risk analysis, decision-making and planning processes from the conceptual phase through the Environmental and Social Impact Assessment to the development of the Environmental Management Plan.	<ul style="list-style-type: none"> Corporate managers 	<ul style="list-style-type: none"> Builds on local scientific knowledge and data Delivers a cost effective product in a timely manner Limited to biodiversity “hotspots” and protected areas



C. Status of Tool Development

Within the set of tools considered above, none are yet fully mature with a robust track record of applications. Rather, the tools sit along a spectrum from being in development, through a “pre-release” phase, to having “beta” versions. Most of the tools — either in their entirety or in a “draft” / “beta” version — will have some public version issued by the end of 2008.

i. Similarities

A range of cross-cutting characteristics emerged in this tool review, including:

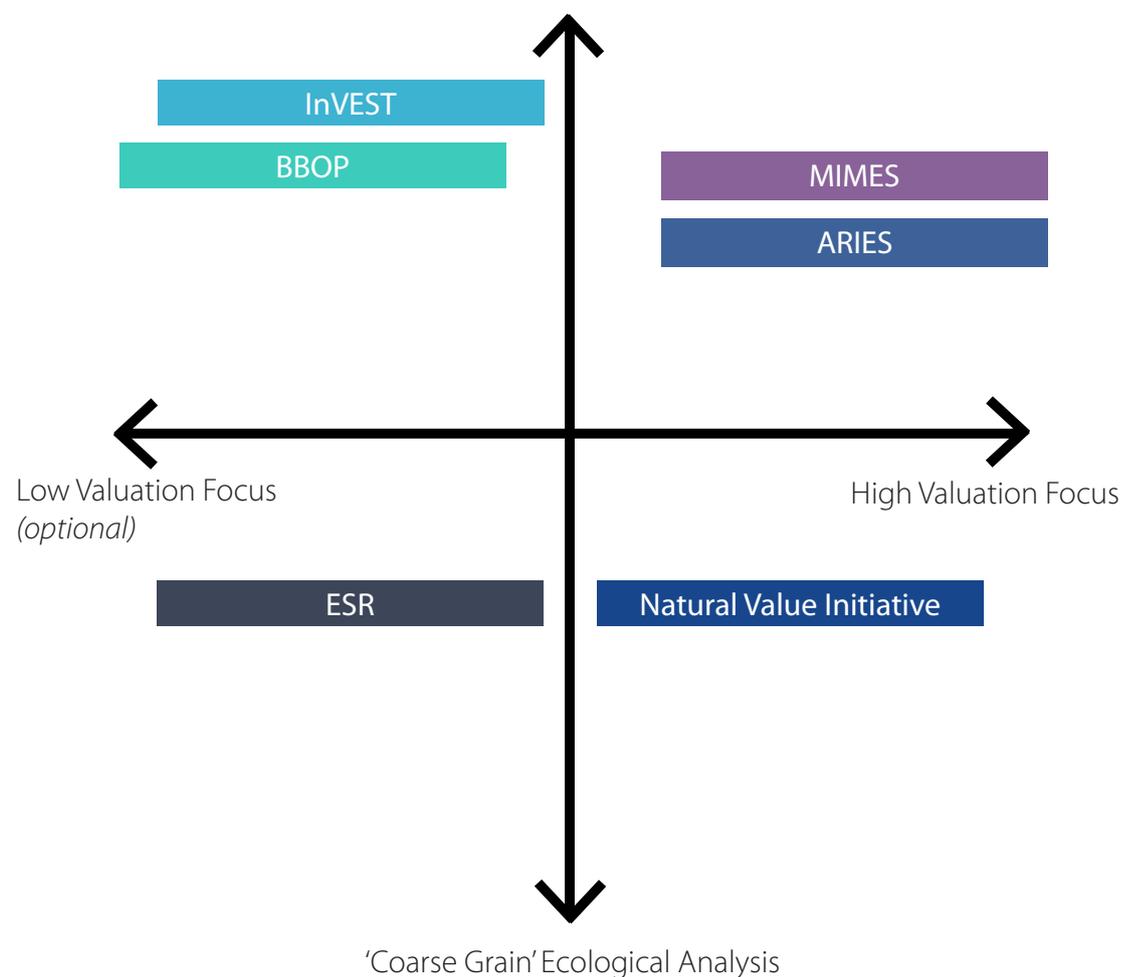
- **Policy-maker focus** as a common “target audience,” most notably with ARIES, InVEST, and MIMES (in comparison, ESR has focused on corporate decision-makers, the NVI on corporate decision-makers in certain sectors as well as investors, and BBOP on businesses, policy-makers, and NGOs).
- **Scalable data, resource, and time demands**, so that decision-makers can use either existing or default data (with ARIES, MIMES, and InVEST, as well as IBAT) or put in whatever level of effort is feasible in terms of their own staff time to undertake the analysis (ESR, BBOP, and NVI).
- **Focused on ease of use**, either through computer models (in beta version of MIMES and IBAT, and in yet to be developed software for ARIES and InVEST) or a series of tasks within an overall analytical approach (ESR, BBOP, and NVI).
- **Involvement of well-respected players** in development of these tools is likely to result in higher levels of attention paid by policy-makers and other target audiences.

ii. Distinctions

Despite some areas of resonance across tools, there are a number of key distinctions:

- **User 'Interface'**, which span from computer models through "workbook-like" excel spreadsheets.
- **Type of Results**, ranging from a list of priority ecosystems to consider through spatially-explicit maps showing changes under different land management scenarios.
- **Data Demands**, from high to low, spanning from do-it-yourself to detailed pre-loaded databases.
- **Ecological detail / emphasis**, including high level / coarse grain assessments through fine-grain, map-based assessments.
- **Valuation emphasis**, which can be further parsed in terms of value within an existing environmental market (such as within the European Union Emissions Trading Scheme) or value within a broader societal context that draws upon ecological economics theory / concepts.

Table 6. Matrix of Tools: Relative Emphasis on Valuation vs. Level of Ecological Detail



In addition to the broader initiatives outlined above, a number of companies are developing tools and approaches that enable them to understand and manage their impacts and dependence on biodiversity and ecosystem services. British American Tobacco, for example, has developed a site-level tool which considers impact and dependence on ecosystem services. Unilever produced sustainable agricultural guidance for a significant number of their major crops. BP and Shell have begun to incorporate ecosystem services principles into their internal Environmental Impact Assessment processes.

D. Making the Tools Operational

Because these opportunities are emergent, markets are fragmented and vary from region to region. It can be arduous to identify the best opportunities, assemble the parties, draft the contractual language, broker the trade, and cash in on credits and incentives.



Schemes are emerging aimed at generating 'biodiversity credits' - tradeable securities that reward activities supporting conservation and the sustainable use of native ecosystems

To begin the process, companies are well advised to first 'audit' their own real estate -- and their dependence on key commodities that rely on ecosystem services -- to understand exactly what ecological systems they own and what ecological services are being produced on those lands and/or in those aquatic systems. While this task is not technically complex—given remote sensing technologies that can be effectively coupled with field data sampling—it is detail oriented and can be resource intensive. Many companies are already aware of whether or not their properties include 'ecological hotspots' and key conservation areas, but this information should be confirmed to identify potential 'high [conservation] value' properties that may be more desirable within the context of environmental markets. Once a company's ecological holdings are clear, then consultations with environmental market experts or key regulatory agencies will assist in identifying potential funding sources for restored areas as well as the most promising sites. Finally, long-term plans for management are often required within these markets and are, therefore, worth careful advance thought and planning.

Companies engaging in these environmental markets are supported by brokers, aggregators, and technical experts from a variety of financial and scientific disciplines who are keen to facilitate engagement of the private sector in these environmental markets. This increased institutional capacity and market infrastructure is evolving rapidly, due in large part to the dynamic international policy and business discussions around climate change.

Corporate strategists have an opportunity to develop a point of view on environmental markets and craft a pro-active strategy within the emerging policy and NGO landscape. Early corporate movers should consider the following activities:

- Conduct an internal Gap Analysis to identify information needs and research activities
- Launch work streams to track emerging issues and regulations, or partner with research institutions or NGOs that already do so
- Revisiting Environmental and Social Impact Assessment protocols to assess their effectiveness in identifying environmental service-related issues
- Assess the internal depth of expertise – or that of preferred consultants -- related to ecological structure and function assessments
- Where exposure to policy developments is real and imminent, prioritize risk assessments for the most relevant business lines or sources of capital
- Consider the emerging suite of tools and select 1-2 to ground truth on appropriate projects, providing feedback to the tool developers where feasible
- Report to project financiers and to select stakeholders as piloting progresses

In the short term, these efforts should ensure that the evolving expectations of regulators, investors and reviewers of new project bids are met. In the medium to long term, the corporate focus should be on assessing emergent environmental service-related community and stakeholder concerns as well as ensuring that environmental service-related risks and opportunities—such as related to carbon / greenhouse gas emissions, water flows, and soil productivity—are fully integrated into the project planning.

In the longer term, engagement in environmental markets – if designed appropriately - may offer greater flexibility to least cost pathways for meeting regulations within the context of environmental markets. At the same time, experience with these markets will increasingly enable companies to understand business impacts on environmental services and functions, both of which are likely to shape perceptions of corporate environmental strategy in the coming years.

V. Emerging Challenges and Looking Ahead

There remain a number of barriers to securing private sector action. These include:

- Lack of company-level data on the financial implications of mismanagement of impacts and dependence on biodiversity and ecosystem services
- Lack of a policy framework that promotes collaboration to manage shared resources on which companies are dependent
- Lack of integration of these issues into well established environmental management tools such as Environmental Impact Assessment or Environmental Management Systems
- Underpinning this, a lack of a widely accepted business case to convince companies of the need to address the issue as one amongst a range of competing issues, and lack of capacity to act

Despite these barriers, the application of market mechanisms to environmental assets is not new. The global growth in their uptake signals a broader sea-change. At the same time, urgent issues like climate change, and water availability are spurring investors to reconsider risks and whether their capital is realizing full potential value. If these environmental market-based trends accelerate and truly transform environmental regulation and management, then it will have been well worth the corporate strategic attention to get out in front of the issues.



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