



Seeing the Future Business Context

Scenarios of How Ecosystem Services Issues May Play Out and Affect the Private Sector

March 2013



About this Report

This report was written by Sissel Waage and Kit Armstrong, with input from Edward Cameron, as well as many thought leaders from around the world who engaged in BSR's Ecosystem Services Working Group 2012 research initiative by responding to our survey, participating in interviews, and/or attending our October roundtable discussion. In this research process, we sought out the input of public, private, NGO, multilateral, and academic sector representatives.

We want to thank all who engaged and gave generously of their time and insights, both in 2012 as well as since the inception of BSR's Ecosystem Services Working Group in 2007. Through the layered research and consultation process in 2012, as described in the research methods appendices, this report is based on the insights of a wide range of individuals across sectors who are engaged with ecosystem services issues around the world.

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Any errors in the report are those of the authors alone. Please direct comments or questions to Sissel Waage at swaage@bsr.org. We particularly welcome input that will help us refine the key trends, uncertainties, and scenarios.

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Executive Summary

How important could ecosystem services become to your company, in what ways, and on what time frame? Will it remain a special interest issue with limited relevance to corporate decision-making processes? Or will stakeholders become actively engaged with ecosystem services concepts, leading to on-the-ground, real-world implications for corporate operations and supply chains? Overall, how could ecosystem services uptake play out in the coming years, with what implications for the private sector?

This report lays out findings from a research process that engaged with thought leaders around the world to gather input and craft feasible scenarios for ecosystem services uptake by 2025. (For details on the research design and methods, please see Appendices 2 through 5.) It lays out the key forces and uncertainties that the research identified as likely to influence the form and pace of ecosystem services uptake, including consideration of social, technical, economic, environmental, educational, and political trends.

Based on our research, the key forces that are likely to shape the uptake of ecosystem services concepts and frameworks in the coming years include:

- » **Financial services institutions and corporate ranking entities now state that they perceive corporate impacts and dependencies on ecosystem services as a class of issues that present business risk**, and therefore are worthy of consideration in due diligence and ranking processes. For example, the World Bank's [International Finance Corporation \(IFC\)](#), the [79 financial institutions](#) that have adopted the [Equator Principles \(EP\)](#), and the [Dow Jones Sustainability Index's \(DJSI\)](#) assessment of the forestry sector all now consider ecosystem services in their decision-making processes.
- » **Governments around the world are convening task forces, pilot testing new approaches, and even crafting policy on ecosystem services**, as detailed in BSR's 2013 report "[Global Public Sector Trends in Ecosystem Services, 2009-2012.](#)"
- » **Academics, NGO representatives, and thought leaders across sectors are advocating for a paradigm shift in corporate performance measurement approaches, in order to adopt a holistic, systems-focused analytical framework**, which is distinct from the current discrete, siloed sets of indicators with which corporate performance is measured today. This trend is evident in the increasing number of respected university and NGO initiatives on development of integrated ecosystem services decision-making aids, as described in BSR's 2013 report "[Measuring and Managing Corporate Performance in an Era of Expanded Disclosure: A Review of the Emerging Domain of Ecosystem Services Tools.](#)"
- » **Companies are engaging with ecosystem services issues**, as 35 businesses now name ecosystem services as an issue which they are tracking or actively working upon in publicly available materials, as detailed in BSR's 2013 report "[Private Sector Uptake of Ecosystem Services Concepts and Frameworks.](#)"

Yet, uncertainties remain in terms of how ecosystem services concepts and applications may play out in the coming years. For example, key details that are essential to corporate implementation of the concepts are still in development, such as:

- » A definitive, widely agreed-upon list of ecosystem services categories and parameters to measure corporate ecosystem services impact and assess dependency,

- » Verified and validated analytical tools for corporate assessment of ecosystem services impacts and dependencies, including systematic consideration of trade-offs and whether or not to apply monetary valuation techniques,
- » Widely agreed-upon data-gathering methods and/or credible, ground-truthed data sets to use in conducting assessments, and
- » Processes and protocols that have been shown effective in private sector settings for integration of ecosystem services assessments into current decision-making processes.

With this report, BSR hopes to start a discussion about the uptake of ecosystem services concepts and frameworks over the coming years, with a focus on implications and pathways forward for the private sector. As a conversation starter, this report lays out the driving forces and uncertainties. It does not, however, offer in-depth analysis of the dynamics that are animating these forces or shaping their relationships, though we would be interested in building out this work in the future with partners. Rather, the focus of this report is on what is happening and how multiple efforts could combine to shape the uptake of ecosystem services by 2025. We welcome input and recommendations for refining, as well as building on this work.

The scenarios developed during our research process, include:

Scenario 1: Eagle Hunt

Demands for corporate disclosure on ecosystem services impacts rise sharply. Companies increasingly see questions about the issues from regulators, public agency officials, pension fund managers, insurance company leaders, NGO activists, and other stakeholders. These questions posed to companies stem from growing stakeholder awareness of the risks presented to all of society from depletion of natural capital and diminished flows of key ecosystem services. The demands for action are so widespread that they ultimately permeate all aspects of corporate performance expectations, reporting, accounting, and stakeholder engagement. Coordination around disclosure is the norm, cutting across sectors, through loose networks and rapidly disseminating information via the internet and social media. Corporate decision-makers are reactive and find themselves with a set of challenging circumstances with an approach that can be characterized as moving from one burning platform to another.



Scenario 2: Raccoon Crawl

Activity on ecosystem services continues to occur across sectors, but there is no critical mass to incentivize large-scale, meaningful change in the private sector. The result is weak signals for change that companies no longer track or consider taking action upon.



Scenario 3: Egret Flight

Industry perceives that there is considerable, growing support for a systems-focused ecosystem services approach that is distinct from current methods of assessing corporate risk and performance. A critical mass of private sector firms proactively engages with public sector, NGO, multilateral, and academic players—through a focused NGO- or multilateral-mediated initiative—to define and implement demonstrations that explore the nuts-and-bolts of applying ecosystem services analytical approaches in both: (1) data-rich sites (such as parts of the United States or Europe), and (2) less well-studied sites (ideally in Africa, Latin America, and/or Asia).



This demonstration work generates experience around feasible private sector pathways for applying ecosystem services concepts in business decision-making processes. It becomes clear that a systems-based approach is distinct from business as usual, but this approach requires significant supporting infrastructure, particularly in terms of data availability and modeling to assess

and discuss trade-offs. Based on this collaborative pilot testing, stakeholders across public, private, and multilateral sectors invest in new data and information technology that moves ecosystem services concepts into widespread corporate performance assessment practice. This work leads to advance identification of private sector impacts on ecosystem services and effective plans for avoidance, mitigation, and/or offset measures—which produce results that are important across public, private, multilateral and NGO sectors.

Which scenario, if any, will come into being is unclear. There is, however, one clear take-away point for corporate decision makers.

Activity on ecosystem services is on the rise—within the public sector, among investors, NGOs, multilateral organizations, and other stakeholders. Therefore, it is time for companies to incorporate ecosystem services within their issue tracking and even issue management portfolios.

With this report, BSR hopes to inspire more discussion within companies about the risks and opportunities that they face in the coming years vis-à-vis ecosystem services, biodiversity, and the linked domain of natural capital. We also hope that these conversations will inspire corporate leaders to set aspirational goals and targets and work on crafting clear corporate pathways forward, as we have recommended in [other written materials](#).

We welcome input on these scenarios and hope to facilitate the pathways forward. Feel free to send thoughts or comments to Sissel Waage (swaage@bsr.org).



Introduction

Some changes in the business operating environment are true surprises. However, many shifts are what futurist Peter Schwartz refers to as “inevitable surprises.” It is clear that in the coming decade some of these inevitable surprises will be related to biodiversity and ecosystem services.



What is likely to happen in terms of biodiversity and ecosystem services that could affect the business climate? How? Where? When? And what potential courses of action should corporate decision-makers be preparing for as they track the issues?

In 2012 BSR’s [Ecosystem Services Working Group \(ESWG\)](#) launched a research and dialogue process to explore possible trajectories for the uptake of ecosystem services by 2025. We were particularly interested in how applications of ecosystem services concepts could affect the private sector and what potential scenarios business leaders should consider in crafting their corporate strategy or planning activities related to these issues.

This report describes the key forces and main uncertainties that relate to ecosystem services uptake, as well as the resulting set of scenarios for how this issue may play out by 2025. Based on our research and the input of thought leaders around the world, we have sought to generate clear, compelling stories about how the current efforts around ecosystem services could evolve in the coming years. These scenarios were developed following from insights in one-on-one interviews with thought leaders, survey responses, and an October 2012 roundtable discussions among public, private, NGO, multilateral, and academic players who are engaged with ecosystem services. (For details on research methods and consultation processes, please see Appendices 2 through 5.)

By issuing this report, we hope to start a conversation. We welcome thoughts about, and reactions to, the scenarios. We would be delighted if this work leads to additional dialogues and actions by a broader range of public, private, NGO, multilateral, and academic sector players around the world. Most of all, we hope that BSR's [Ecosystem Services Working Group](#) research initiative on this topic will catalyze collaborative processes to bring desired future scenarios into reality.



Background



Just as there is financial capital, so too is there natural capital. People draw upon both financial and natural capital every day, in terms of cash (or money) and ecosystem service flows (of clean air to breathe, water to drink and use, food to eat that is grown in productive topsoil, weather that is reasonably similar to what they have always known, and many other services).

Most societies account only for financial capital—as if it were the only basis for economic transactions and flows. Yet, natural capital and the flow of ecosystem services are essential for society and business to function. For example, forests play a role in controlling the flow of water, decreasing erosion, averting sedimentation in rivers, and enabling underground aquifers to recharge. Coastal mangroves can buffer landmasses from storm impacts and serve as nurseries for fish populations. (For definitions of the concepts of natural capital, biodiversity, and ecosystem services, please see Boxes 1 and 2.)

Box 1: Natural Capital and Ecosystem Services

Natural capital can be understood as including natural stocks (e.g., forests), which are comprised of:

- » Ecological **structures** (trees here, rivers meandering there), that
- » Enable ecological **functions** (e.g., filtering of water, retaining soil in place, providing habitat for pollinating insects, etc.), and
- » Yield **services**, including natural resources that are commonly considered goods (such as, timber, crops, etc.) as well as services (such as, reliable access to water).

Overall, ecosystem services come in many forms, ranging from timber or broccoli grown, through water filtered and replenished within underground aquifers that can be reliably drawn on, and coastal areas buffered from storm surges by natural mangroves, to name just a few.

Box 2: Defining Biodiversity and Ecosystem Services

“Biodiversity is the life support system of this planet. Human livelihood depends on biodiversity in the form of genetic material, species, and ecosystems.

Ecosystem services are the benefits obtained by people from ecosystems.

Biodiversity is crucial in the provision of ecosystem services, since the functioning of an ecosystem and thus its ability to provide services is strongly influenced by the functional and structural variability in species, as well as the quantity and distribution of all three components of biodiversity (i.e., genes, species, ecosystems).

Ecosystems services can be local, such as pollination or the provision of freshwater, others regional (flood and landslide control), and still others global in nature (climate regulation). While there are conflicting views on the rate of species and ecosystem loss, there is no doubt that this process poses serious risks for human well-being.”

Excerpted from “A Framework for Corporate Action on Biodiversity and Ecosystem Services,” UN Global Compact and the International Union for Conservation of Nature, 2012, <http://cmsdata.iucn.org/downloads/biodiversity2012.pdf>

These ecological structures, flows, and dynamics are so fundamental that they are taken for granted by society and business alike. It is like taking for granted the very bones and blood in our bodies, which enable people to stand straight and function.

Among thought leaders in academic, NGO, and multilateral institutions, there is little debate that ecosystem services overall are trending downward—in the direction of degradation. The documentation is extensive and includes the [Millennium Ecosystem Assessment \(MEA\)](#), [The Economics of Ecosystems and Biodiversity \(TEEB\) study](#), [UN Environment Programme \(UNEP\) Global Environmental Outlook \(GEO\) 5 report](#), and [peer-reviewed academic journals dedicated to ecosystem services](#).



The driver of these downward trends is clear. Few incentives exist for the private sector to financially invest in the maintenance and restoration of biodiversity and ecosystem structure that contributes to ongoing function, as well as the flow of goods and services. When voluntary or regulatory incentives exist, they are not always acted upon or enforced, or the fines are so low that they fail to deter negative impacts.

The current state of play, therefore, is that while ecosystem services are widely recognized and valued in the abstract, there are few drivers for restoration and maintenance in practice. For advocates of ecosystem services, the need is clear, as relayed in the words of thought leaders during BSR's 2012 research process (see Box 3).

Box 3: Why Shift to an Ecosystem Services Approach? Voices of Thought Leaders and Advocates

"An ecosystem services approach provides a context for decision making. Who would know, without context, whether a company that was emitting 400 kilos of silicon tetrachloride was really, really bad or just sort of bad? Thinking of things in terms of 'what does this ecosystem produce, and how is that valued' is a really useful way to think this kind of problem through. Environmental analysis is easier to do if all one does is count up emissions, but much harder to do in terms of thinking through whether these quantities are problems or how big the problems are."

—Financial analyst in response to BSR's 2012 survey

"Cumulative impacts can be evaluated much more effectively with the application of ecosystem services approaches and outputs to new models. Imagine looking at quantitative model projections of the supply of ecosystem services over the next 50 years under alternative management scenarios (i.e., alternative futures). This would be a powerful decision-making tool at the local, regional, state, and national scales."

—Government official in response to BSR's 2012 survey

"Ecosystem services have been largely been ignored in the past, leading to many important environmental benefits and costs not being taken into account in decision making. This has meant that the environment and economy have been managed in such a way that societal welfare and wealth have been decreased rather than increased—through increased conditions for illnesses, loss of natural resources base leading to scarcity or collapses, loss of recreational and aesthetic amenities, and cultural and spiritual meaning losses. For instance, there are cases where we could have used wetlands to break down wastes, rather than building large plants to do so, or protected drinking water from contamination by keeping areas forested. Without ecosystem services values being taken into account, these opportunities are lost to us."

—Government official in response to BSR's 2012 survey

"The ecosystem services concept provides an improved basis for managing social and ecological objectives by acknowledging and accounting for the ways in which people depend upon well-functioning natural systems. The value added by this approach is to encourage a more integrated management paradigm that emphasizes ecological process and functions and the social benefits that result, rather than separately funded and output-oriented program targets. Today's environmental impact assessments also follow a program-by-program approach. Currently, individual resource specialists produce separate reports by discipline (wildlife, fisheries, and botany), but there is limited opportunity for considering the landscape in an integrated fashion, including relationships among resource areas."

—Government official in response to BSR's 2012 survey

Trends and Key Forces

BSR's 2012 research and consultations with thought leaders identified a range of forces that are currently influencing the uptake of ecosystem services, as summarized in Table 1. (Please note that this list may not be exhaustive of all the trends that could ultimately affect the uptake of ecosystem services. We welcome input and comments on additional trends that may exist and could affect uptake of ecosystem services concepts and analytical approaches.)

Table 1: Trends That Could Shape the Uptake of Ecosystem Services

Social	<ul style="list-style-type: none"> » Global urbanization with greater access to media and the flow of information, through handheld technologies » Social equity and human rights issues increasingly on the agenda of citizens, NGOs, academics, and other stakeholders » Growing middle class around the world, resulting in greater demands on natural resources » U.S. and European consumer interest in understanding the origins and impacts of products and services, as marked by the rise of environmental and fair-trade screening lists and approaches (e.g., Good Guide, Environmental Working Group product lists, etc.) » Activism on environmental and social issues around the world that focuses on increasing the global visibility of corporate actions, particularly given the internet's wider availability, along with the technology to use it (e.g., 350.org, Amazon Watch, Avaaz, Greenpeace, Rainforest Action Network, and many other efforts such as those honored by the Goldman Prize)
Technical	<ul style="list-style-type: none"> » Increasing work on assessing impacts of goods and services, such as through rating programs (e.g., energy usage of products); certification programs, which are projected to proliferate in 2013 (e.g., Forest Stewardship Council (FSC), organics, fair trade, etc.); and other quantitative approaches to making visible ecological impacts of consumer goods and services (e.g., ecological footprint or ecological rucksack approaches) » Disclosure on the rise (e.g., the Carbon Disclosure Project (CDP) and its related water program, Forest Footprint Disclosure, and supply chain disclosure of multiple parameters, from emissions through labor practices, as laid out on corporate websites) » Sharing of information and points of view quickly via social media (e.g., Facebook, Twitter, LinkedIn, etc.) and regularly updated information-aggregator websites (e.g., Wikipedia, Scoop.it, etc.) » Access to more data and information by handheld technology (e.g., iPhones, tablets, etc.)
Economic	<ul style="list-style-type: none"> » Shareholder questions about new risks, particularly given climate change, and associated inquiries, as well as activism » Corporate ranking questions about whether business management (e.g., DJSI) considers the full suite of risks and opportunities that face companies today » Increased supply chain brittleness due to climate change and greater incidence and severity of extreme weather events

Environmental	<ul style="list-style-type: none"> » Accelerating trends toward extreme weather as climate change continues, with increasing periodicity of weather-related societal and business disruptions (such as too much or too little water in certain parts of the world during particular times) » Ongoing documentation of climate change-related issues, such as water availability and biodiversity loss, as well as (previously underappreciated) positive feedback loops that are accelerating or amplifying the effects of changes » Local pollution and waste issues, particularly as they relate to human health and illness » Access to natural resources, such as future shortfalls in crop and/or timber production, flows of water, etc.
Educational	<ul style="list-style-type: none"> » Increasing number of environmental programs in universities, including sustainable business programs (such as Stanford University, the leading Brazilian business school Fundação Getulio Vargas (FGV), Cambridge University, among others)
Political	<p><i>From career environmental professionals in the public sector:</i></p> <ul style="list-style-type: none"> » Growing interest in integrated, systems-based approaches, as indicated by upward trends around public sector engagement with ecosystem services <p><i>From political appointees in the public sector:</i></p> <ul style="list-style-type: none"> » Lack of political will to tackle challenging and contentious issues (e.g., climate change, water, etc.), which is a symptom of increasingly entrenched and polarized interests <p><i>Overall:</i></p> <ul style="list-style-type: none"> » Growing momentum around biodiversity, ecosystem services, and natural capital, as evident in launching of Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), the Natural Capital Declaration, World Bank's Wealth Accounting and the Valuation of Ecosystem Services (WAVES) partnership, and TEEB » Gridlock resulting from a range of issues, including public sector budget challenges in various countries around the world

These trends are coming together through four key forces that could, and likely will, shape the uptake of ecosystem services.

Key Force #1

A growing number of academics, NGO representatives, and other thought leaders are advocating for a paradigm shift in environmental (and linked social) corporate risk and performance measurement approaches—from discrete, siloed sets of indicators, to approaches that take an integrated, watershed- or even landscape-scale look at environmental and social indicators, relationships, and dynamics.

Over the past two decades, concepts related to ecosystem services have gained support among academic, public, multilateral, and NGO sector representatives. For example, academic research on ecosystem services was featured in the 1997 [publication](#) of *Nature's Services: Societal Dependence on Natural Ecosystems*, which was edited by Gretchen Daily of Stanford University. More recently, two international initiatives expanded existing research on the topic. The first was the 2005 Millennium Ecosystem Assessment ([MEA](#)), which was based on findings from almost 1,300 scientists working around the globe. The second was the set of reports issued in 2010 by [TEEB](#) (The Economics of Ecosystems and Biodiversity), which originated at a meeting of G8+5 Environment Ministers. More than the assembly of a considerable body of information, these reports reflect a growing set of voices espousing a new approach to, and indicators for, measurement of environmental and social issues as linked parameters that needed to be understood in terms of relationships and dynamic systems. The

Box 4: NGO Voices on the Potential for Uptake of Ecosystem Services by 2025 From BSR's 2012 Research and Convening

"We are working to come up with relatively consistent measurements and indicators for ecosystem services. We are also working a policy path to promote legislation to move ecosystem services concepts into policy."

"The degree to which NGOs will get on board with ecosystem services will depend on where biodiversity fits into ecosystem services. Some have problems with risk that non-measurable values will not still be recognized and taken into account. But we want to keep moving toward a more holistic approach. We hope that will promote better decisions and management of resources."

"In 10 years, we will see many mainstream companies managing ecosystem services impacts and dependencies as a means by which to manage risks and harness opportunities, as opposed to today when only a select few front-runners are doing so to demonstrate leadership. In 15 years, I believe that ecosystem services considerations will be mainstreamed into society at large, mainly driven by the vast negative effects of ecosystem degradation."

Source: BSR's 2012 interviews and survey

rationale for an integrated, systems-based analytical approach was succinctly articulated in a 2012 interview with BSR, when a NGO representative explained: "There is an increasing realization in the natural resource community that managing resources separately (water, forest, wildlife, etc.) has a tendency to create conflict, duplicate efforts, and generally produce suboptimal results."

However, ecosystem services concepts are still relatively academic without a large body of applications, particularly in the private sector. Corporate efforts are emerging now, as documented in a 2013 BSR [report](#). In addition, a growing number of international NGOs are implementing initiatives, such as those laid out in Appendix 1. Increasingly, a critical mass of players across the academic, NGO, multilateral, and public sectors are seeking to craft clear pathways from concept to practice.

The year 2012 may prove to have been pivotal for the wider application of ecosystem services concepts. At the June 2012 Rio+20 meeting, the United Nations Environment Program (UNEP) in collaboration with other partners issued the [Natural Capital Declaration](#), which has been signed by 41 financial institutions. In the same month, the World Bank released their "[Moving Beyond GDP](#)," which documents that 24 nations are using some form of natural capital accounting. Both documents suggest that the linked issues of ecosystem services, biodiversity, and natural capital will continue to generate considerable work in the coming years in an effort to change the downward direction of global trends as documented in the [MEA](#) and [other studies](#).

A key area of focus in the coming years will need to be on the most appropriate applications of ecosystem services concepts and frameworks, particularly in the private sector. In the words of one academic during a 2012 interview with BSR:

We have to be careful about a framework looking for an application or a tool looking for a purpose. We need to look for how ecosystem services fits into a frame of preexisting environmental management.... The problem is that there are many people who want ecosystem services to be-all and there remain definitional issues. Ecosystem services deals well with quantifiable resources (such as water supply services), but less well with qualitatively measured resources. In addition, the human brain will bias itself if presented with fuzzy versus quantifiable parameters. So, we need to ask: What are the cases in which an ecosystem services approach is the right approach?

Overall, it is unclear whether NGO activity on ecosystem services will continue to build and link across organizations, to unify around common definitions that unroll into assessment and measurement indicators that can be applied in private sector settings. It is also still emerging whether or not the NGO sector will continue to debate key issues about the relationships between biodiversity and ecosystem services as well as valuation. At present, however, the overall direction appears to be toward building and deepening work on ecosystem services within the NGO sector, with the implication of becoming a strong driver for future corporate engagement.

Key Force #2

More and more financial services lending institutions, insurers, and corporate ranking organizations now perceive corporate impacts and dependencies on ecosystem services as a class of issues that present risks for some business sectors and therefore are worthy of consideration in due diligence and ranking processes.

The past few years have seen ecosystem services shift from an emerging issue to a part of the international corporate best practice due to its inclusion within:

- » **The Dow Jones Sustainability Index (DJSI)** ranking process, which now assesses whether companies in some industry sectors, such as forestry, have a process in place to understand corporate ecosystem services impacts and dependencies;
- » **The World Bank Group's International Finance Corporation (IFC)** performance standards and due diligence processes;
- » **79 global financial institutions** due diligence processes, referred to as the [Equator Banks](#); and
- » **Leading insurance and reinsurance companies** work, such as [Swiss Re's](#) award program that seeks to incentivize sustainable watershed management, as illustrated by their award to a [Kyrgyzstan project](#), and the Fireman's Fund Insurance Company's [green homes insurance program](#) that seeks to incentivize investments that will use fewer natural resources.

As these companies seek to integrate considerations of ecosystem services into their decision-making processes, the challenge is that conducting due diligence requires access to information about a company's impacts, dependencies, and thus risk exposure. Businesses often do not have this information or are unwilling to risk the legal and other exposure that may be associated with communicating it. In the words of a financial services leader in response to a 2012 BSR survey question:

What's a company's impact on ecosystem services? Almost every time, the only reason we know is one of two things: (1) the company reports on this, and it is accurate, or (2) there has been a disaster significant enough to affect other people or communities that is covered in the press (like the cyanide spill that polluted the Danube about 15 years ago or the Deepwater Horizon blowout).

There are very few companies that report on their impacts, and those that do usually only cover their direct operations, not their supply chain. (However, the Forest Footprint Disclosure, which is now part of the Carbon Disclosure Project [CDP], has been helping to push back the veil of ignorance on this one). And reporting on disasters is almost never dispassionate and entirely factual. [Therefore,] there is a tendency for this kind of reporting to be very pejorative. It can be quite difficult to sort the actual facts from reporting on an ecological disaster . . . [T]hese two sources cover some infinitesimal share of what true corporate impacts on ecosystem services really are, so knowledge is the major limitation right now.

The second [challenge] is scientific knowledge of how ecosystems really go about producing the services that they produce. We know at a fairly macro level, for instance, how much carbon is sequestered by forests. What we do not know is exactly how, and it was not until a couple of years ago that we really found out just how important boreal-zone lakes were in that sequestration matrix. There are an awful lot of things that science does not absolutely know about the "wiring diagrams" of ecosystems, and we almost never know where the tipping points are. So it is hard to say whether the impact of any specific corporation is in the zone called sustainable or in the one called unacceptable.

NGOs and academics are working to bring more information to light for use by investors, as well as to catalyze shareholder and consumer activism. For example, Rainforest Action Network's (RAN) work on rainforest-free paper has included the testing of paper used in various children's books to identify the forests from which they were sourced. This information was then used to launch

a campaign against companies that were selling children's books made from paper sourced from rainforests. RAN [reports](#) that this work has in turn driven significant changes in paper purchasing practices among key purchasers. It is an example of how ecosystem threats can now be tied to specific products through focused campaigns that change corporate practices.

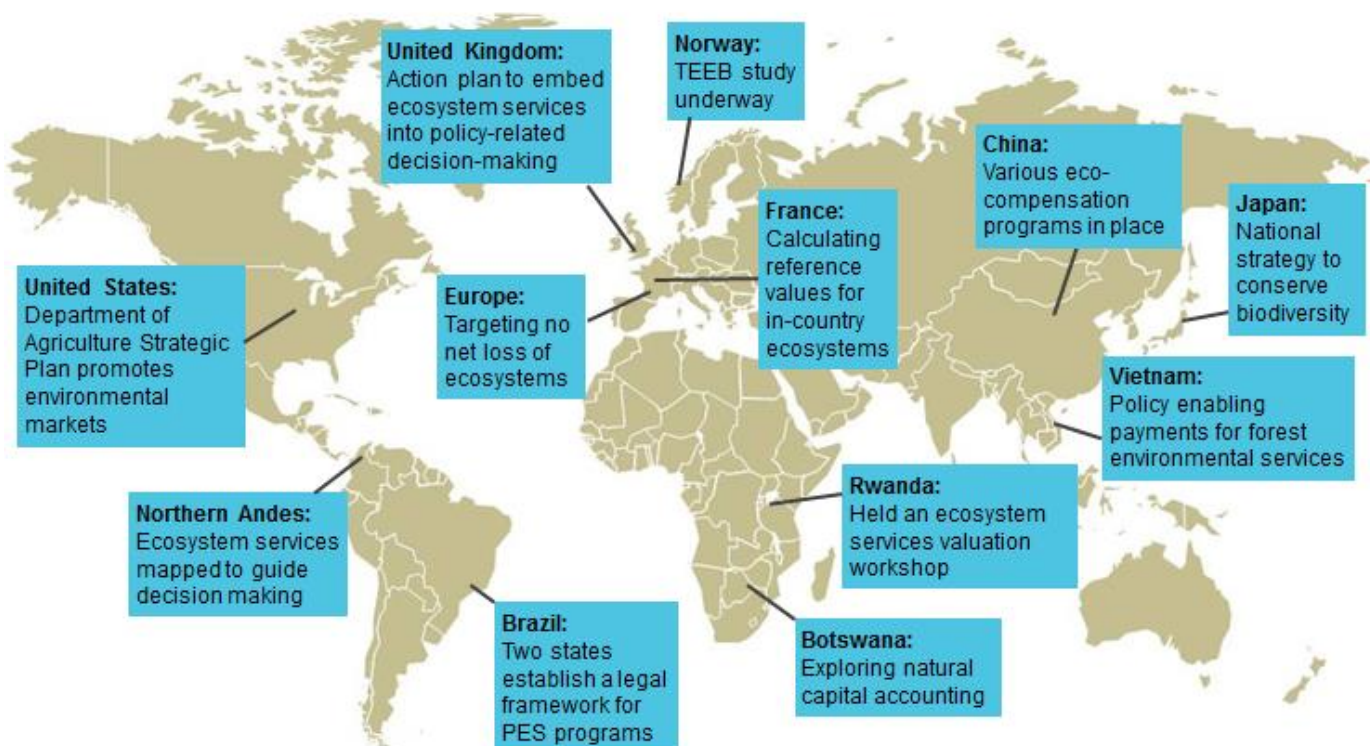
Overall, the uncertainties around what indicators companies should use to assess ecosystem services impacts and dependencies, as well as the difficulty of obtaining and risks of disclosing such information, will likely remain barriers to full and credible corporate transparency in this arena for some time to come. It is likely, however, that innovative methods for shedding light on corporate impacts and dependencies will continue to be developed with the potential to quickly move ecosystem services concerns to become significant issues for companies and brands.

Key Force #3

Government officials are exploring ecosystem services by funding research, undertaking pilot project applications, forming task forces, and, in some countries, crafting new policy and laws.

Activity associated with ecosystem services is under way in 16 national and regional governments, as described in detail within a [2013 BSR report](#). In addition, 24 nations are currently deploying some form of natural capital accounting in their economic decision-making processes, which includes consideration of ecosystem services, according to the World Bank's "Moving Beyond GDP" [report](#). This work is synergistic with that of the 11 countries engaged with the World Bank's [WAVES](#) global partnership, which is focused on "ensuring that the national accounts used to measure and plan for economic growth include the value of natural resources." The WAVES partnership includes representatives from the governments of Australia, Botswana, Canada, Colombia, Costa Rica, France, Japan, Madagascar, Norway, the Philippines, and the U.K. Overall, public sector activity on natural capital and ecosystem services is under way around the world, as depicted by the illustrative initiatives in Figure 1.

Figure 1: Public Policy Uptake of Ecosystem Services Concept





Among the wide range of work underway, one noteworthy initiative is within the European Union (EU). Specifically, the European Environment Agency (EEA) has developed [ecosystem capital accounting](#) as a tool to help integrate its multidimensional information system and connect with socioeconomic statistics, in order to deliver aggregated indicators to policy makers. The ecosystem capital accounts implemented by the EEA are known as [LEAC](#) (Land and Ecosystem Accounts), which have been produced since 2006, and [SECA](#) (Simplified Ecosystem Capital Accounts). According to one of the analysts working on SECA, in a 2012 response to a BSR survey, future work by the EEA will include:

...[A] top-down approach for the 27 EU countries, input data in the one-square-kilometer grid (including socioeconomic statistics), 10 years of time series data, physical accounts of the ecosystem capital (capability to supply ecosystem services), measurement of ecological debts (with a special currency based on physical indicators), provisioning and a few other services, and valuation of degradation of ecosystem capital capability based on remediation costs.

Other illustrative initiatives are underway within the U.S. government. For example, in 2008, the U.S. Department of Agriculture (USDA) established the Office of Environmental Markets ([OEM](#)) to catalyze the development of markets for ecosystem services. In 2011, the U.S. President's Council of Advisors on Science and Technology (PCAST) issued a report entitled "[Sustaining Environmental Capital: Protecting Society and the Economy](#)," that called for agencies to develop capabilities for ecosystem services valuation and factor findings into planning and management decisions. The PCAST report also called for an expansion of knowledge about the ecosystem service impacts of activities taking place on both public and private lands, and asks that federal agencies collaboratively develop an assessment methodology. In 2012, the U.S. Forest Service (USFS) policy specifically named ecosystem services consideration in the [2012 Forest Planning Rule](#).

Despite all of this activity, the challenge in the United States, as well as other nations, is overlaying and meshing this work on ecosystem services with preexisting mandates and processes. For example, the U.S. Congress funds some public agencies, such as the USFS, to produce discrete units or accomplishment targets (such as, million board feet of timber or acres treated for fuels reduction). When specific targets are tied to budget line items, unintended consequences can ensue, such as motivating siloed management that emphasizes production of timber volume or treated acres. Such a tight focus could be in opposition to an integrated lens that considers management in terms of ecological processes and functions over time for provision of an optimized set of multiple benefits. Meshing multiple objectives will be essential to forging pathways forward in ecosystem services application.

Of course, even when meshing ecosystem services concepts and analyses with pre-existing efforts, another issue is the time, and thus cost, required to undertake ecosystem services work. As one U.S. government agency representative observed in responding to a 2012 BSR survey:

The challenge is to discover how to conduct assessments that are rigorous and based in sound science, but are doable and can be woven into existing processes. If ecosystem services approaches become burdensome, then they will not gain widespread support.... [Also] Because public lands management is such a varied field, it is probably best to offer

some flexibility so that decision makers can select an assessment methodology that best fits their landscape ecologically and socially.

Despite these real challenges, efforts by a number of public sector agencies are starting to yield a growing set of application arenas for ecosystem services thinking. Illustrative public sector applications are provided in Table 2.

Table 2: Potential Public Sector Applications of Ecosystem Services Concepts and Approaches

Public Sector Application	Example
National accounting	World Bank's WAVES project pilot countries
Land use planning	Government of Colombia
Landscape-scale conservation planning	USFS's All Lands Approach U.S. Landscape Conservation Cooperatives
Environmental impact assessments (EIAs)	World Resources Institute's ecosystem services in EIA work
Cost-benefit analysis and tradeoff decisions	Exploratory work
Designing public-private voluntary programs and collaborative initiatives	USDA's OEM

In addition to national and subnational governmental initiatives, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) was established in April 2012. The international entity is currently working on overarching concepts and definitions that will likely become a key source for, as partner International Union for Conservation of Nature (IUCN) [states](#), “generating, catalyzing, and coordinating reliable BES [biodiversity and ecosystem services] information and knowledge for business and other stakeholders” in the coming years.

Other efforts related to ecosystem services in the public sector include integrating the concepts into national accounting. For example, the UN Committee of Experts on Environmental-Economic Accounting ([UNCEE](#)) weighed in on the issue of ecosystem services through its participation in the editorial board for the second volume of the UN System of Environmental-Economic Accounting ([SEEA Part 2](#)) that addressed experimental ecosystem capital accounting.

Overall, as with efforts in the financial services and NGO sectors, the challenge for public sector officials is how to move forward with ecosystem services applications in the face of emerging analytical approaches, data, and budgets. Therefore, governmental momentum on ecosystem services uptake could be slow due to the concept's complexity, the cost of applications, and the institutional barriers. Its future will likely depend on whether public sector entities can forge effective collaborative initiatives across agencies and even across nations, as well as with NGOs, multilateral organizations, academics, and the private sector to address existing barriers.

Box 5: Government Voices on the Uptake of Ecosystem Services by 2025 From BSR's 2012 Interviews, Surveys, and Roundtable Discussions

"Some in top leadership [in the U.S. government] are gung ho about an ecosystem services approach, but others don't want to change the way things are done. Yet, there is interest in federal agencies, most notably Management and Budget, and therefore we are likely to see considerable attention on ecosystem services by 2025, particularly for water use, remediation, integrated water resources management, and planning studies..."

"[Today] ecosystem services are used in a peripheral, qualitative way. By 2025 we will be using them in a quantitative, core way to support planning and funding requests."

"By 2025, using ecosystem services in decision making will be routine. We will have consistent approaches and defined uncertainties . . . We already have some of the things we will be measuring, but do not have others. We need to ask what kind of data we will need and how good it is. We will need broader availability of data being collected to make the trade-off decisions."

"We are working to address expectations to include more non-monetary values about environmental goods and services in decision making. We have models for water and carbon valuation. There are lots of cost benefit decisions being made for big agricultural projects that are including these issues and measures. We are also working toward integration of ecosystem services into a national accounting system, but it will probably take longer than 2025 to get there."

"...In the United States, state and federal regulations are expanding opportunities for ecosystem services, as well as developing reliable metrics and monitoring structures that will further their use in the future. In less regulated countries, there are fewer drivers for uptake and less assurance that the associated benefits will be realized or maintained."

"Around the world, it is unlikely that there will be regulation around ecosystem services. Yet, there is momentum. Ecosystem services will be driven forward primarily by NGO pressure, though there are two legal vehicles that will be used by governments: (1) mitigation requirements and/or (2) environmental impact assessments (EIAs)."

"Unofficial talks foresee ecosystem capital accounts as the main reporting framework within 5 to 10 years."

"I expect our government's policy and staff capacity around ecosystem services to become more and more formal over the next 15 years. In the short term, staff will continue to engage with case studies and develop methodologies for applying ecosystem services considerations to planning. Within 15 years, I expect we will have learned from the lessons of these pilot efforts and have more explicit guidance for land managers. We will also continue to support the development of ecosystem services markets in the private sector and strengthen our relationships with NGOs. Our public lands can be testing grounds for metrics and can serve as laboratories for emerging methodologies for use across sectors."

"I believe the current trend of integrating ecosystem services into decision making will continue to grow. In five years, I foresee more federal government departments using this approach within their formal decision making processes. In 10 years, I see an integration of this approach into national accounting frameworks. In 15 years, I see a large uptake by the general public of the concept and more precise GIS [geographic information systems] data making this information more readily disseminated to the public in a way that is visually accessible and makes it better understood."

Source: BSR's 2012 interviews, survey, and roundtable discussions.



Key Force #4

Companies are increasingly engaging with ecosystem services in ways that vary widely in sophistication, depth, and breadth.

Recognizing the key forces driving stakeholders' interest in ecosystem services, a growing number of companies are engaging with ecosystem services. Among the 35 companies that now mention ecosystem services in publicly available materials, it is clear that corporate applications cover the spectrum—from integration of new measures into corporate accounting to adding a new element within risk management and impact assessment protocols. (For details, please see BSR's [report](#) on corporate engagement with ecosystem services.)

In a 2012 interview with BSR, one corporate representative expressed the view that:

The ecosystem services concept should allow you to step back and understand how a company and the natural environment are connected, as well as help to avoid unintended consequences.

Corporate application of the [ecosystem services] concept has the potential to introduce sweeping changes in how industry operates and even is regulated. Historically, we saw environmental problems in engineering ways and in terms of engineering metrics that were discretely measureable (e.g., biomass, units of birds, boxes feeding into boxes). We were incident driven—the problems drove the regulation, which drove the science and in turn dictated the way that you approach the problem. Ecosystem services, however, offers a more integrated approach. [Corporate uptake of ecosystem services concepts and frameworks would mean that] we would have to focus on outcomes and system function, rather than discrete individual measures to meet.

The challenge today is that there is not enough money for scientific information gathering around all ecosystem services parameters.

Yet, work is under way in at least 35 companies. As a result, private sector pilot tests of ecosystem services concepts are yielding a growing set of insights around the potential value that ecosystem services approaches could add to companies, such as those shared in BSR's 2012 research process, which include:

- » **Some companies' current environmental, social, and health impact assessments (ESHIA) are missing the insights that are garnered from even a high-level ecosystem services assessment.** A number of corporate representatives asserted, in 2012 interviews with BSR, that ESHIAs tend not to systematically cover all ecosystem services impacts and dependencies. A government official, in a separate 2012 interview, predicts that future approaches that integrate ecosystem services will be starkly different: "The distinction rests on how alternative plans are formulated and evaluated; the former approach [to ESHIAs] is an 'afterthought' approach—select a plan, then figure out how to mitigate for the impacts. The latter is a way to incorporate a systems- and watershed-level thought process and helps planners to find a balance among the desired services that could be provided by the project and different designs."
- » **Certain companies' risk identification and management processes omit some risks associated with ecosystem services.** Ecosystem services risks and opportunities do not appear to be consistently addressed in risk management processes in some industries and companies.

- » **A segmented approach to issues is the norm in current corporate processes, as opposed to an integrated social-environmental approach that is the core of ecosystem services.** Ecosystem services approaches make explicit connections between environmental and social performance functions, which tend not to otherwise be made. In addition, for companies that focus on safety, social well-being, and other (more socially oriented) parameters, the ability to discuss ecosystem services as the benefits that humans receive from well-functioning ecological systems has offered a positive way to bridge the often discrete sets of social and environmental issues that companies face. Social performance and social investment framing of ecosystem services thus have facilitated internal communication about managing environmental and social impacts and trade-offs. This approach has also enabled companies to incorporate ecosystem services considerations and analytical approaches into sustainable development efforts and nontechnical risk assessments.
- » **Certain contexts will benefit more than others from an ecosystem services assessment.** For example, one company has concluded that an ecosystem services assessment is likely to be most relevant to projects and assets that have one or more of these criteria: significant impact on ecosystem services, significant project dependence on ecosystem services, high stakeholder dependence on ecosystem services, and/or interest in drawing attention to cumulative effects and associated business risks that may arise from these effects.

Looking forward, the more companies engage with ecosystem services issues, the more likely stakeholders will be to expect engagement—thereby driving a greater number of businesses to consider and act upon the impacts and dependencies. In addition, the more private sector pilot tests of ecosystem services applications occur and are shared, the more how-to insights will emerge, thereby paving the way for greater private sector uptake through defining feasible pathways forward.

It is noteworthy, however, that there are countervailing forces against rapid and far-reaching corporate uptake of ecosystem services. The term *ecosystem services* sounds academic or technical. It can be hard to explain and make it relevant to business managers. In a 2012 interview, one corporate analyst asserted that: “Talking about biodiversity and ecosystem services is fun if you are a systems thinker or an ecologist, but actually hard to do if you are talking to business. It is much easier if you are talking about availability of commodities over time, with a risk and opportunity lens.”

Even this approach to considering ecosystem services in terms of supply chain management and stability does not always persuade business decision-makers. Rather, some business leaders believe that the issues are no different from those addressed in their company’s current corporate sustainability approaches. The difference between today’s practices and ecosystem services approaches is essential to show, particularly for industries with well-developed sustainability initiatives. Documentation of the value added of these new analytical frameworks also needs to be detailed, above and beyond anecdotes. Far more publicly available case studies are needed to support arguments that applying ecosystem services concepts will generate new insights within corporate settings.

Box 6: Corporate Voices on the Uptake of Ecosystem Services by 2025

“I expect that by 2025 ecosystem services to be widely accepted, replacing discrete environmental studies, and becoming integrated across decision making.”

“By 2025, biodiversity and ecosystem services (BES) will be part of our corporate decision process. We are hiring people with expertise.”

“By 2025 we will be valuing ecosystem services just as we value other aspects of business— capital, labor, fuel, etc. We will have models for the price of water, pollination, and other factors upon which our business depends. We will be able to take ecosystem services into account, not because it is regulated but because it makes business sense and is accepted by the accountants. We will be expected to use ecosystem services data just like we are expected to use the present cost of energy, raw materials, and other inputs.”

“By 2025, we will see ecosystem services implemented in project front-end planning, as part of risk and stakeholder identification, aligned with the International Finance Corporation (IFC), and looking at ecosystem services impacts as part of the mitigation hierarchy. We will also have integrated reporting, which will be reflected in the Global Reporting Initiative (GRI) indicators and national accounts, as well as corporate profit and loss accounting. There will be much more convergence of sustainability and financial accounting.”

“By 2025, we will be using the ecosystem services concept and approach in supply chain management.”

“We started tracking ecosystem services to understand how it differs from what we already do through the company’s environmental management processes. We are interested in how ecosystem services fits into movement toward more holistic environmental management. By 2025, I am not sure that ecosystem services will get traction, but if so, it will probably be under another name.”

“We are already doing a lot on environmental stewardship and ramping up with more. We already do a lot on sustainable livelihoods in communities where we operate. So far, ecosystem services are not seen as a solution to any problem.”

Source: BSR’s 2012 interviews, survey, and roundtable discussions.



Key Uncertainties

Business decision-makers who are engaging with (or even just tracking) ecosystem services issues want to know what will happen next and how it will affect business. Specifically they want to know:

- » Will the uptake of the ecosystem services concept be rapid and extensive, requiring significant changes in corporate processes and protocols?
- » Could companies be faced with documenting baseline impacts and dependencies of operations and supply changes within specific watersheds in the United States, Europe, Asia, Latin America, and Africa, and/or across large landscape areas?
- » Or will uptake be slow, of limited relevance, and with few real changes in current corporate environmental management practices and protocols?

Skeptics of ecosystem services concepts, particularly those concerned that efforts to address biodiversity loss will be undercut by the application of ecosystem services approaches, remain a countervailing pressure in the NGO community. In the words of an NGO advocate of ecosystem services approaches in response to a 2012 BSR survey:

The conservation community needs to be persuaded that this approach will lead to more and better conservation investments. For example, when riparian vegetation is restored instead of building a cooling tower on a water treatment plant, the range of benefits to water quality, fish and wildlife, recreation, and other factors are far superior to a narrow and expensive engineering solution.

Many conservationists inherently resist the concept of offsetting ecological damage as the outcome is generally seen as a loss or trade, not improvement. We need to institutionalize the concept of net conservation benefit for projects.

We also need to emphasize the concept of linking site-level projects to broader landscape strategies so people understand the big picture and the benefits are delivered at a relevant scale.

Despite increasing clarity on *where* ecosystem services concepts could be fruitfully applied in corporate and some government settings, *how* it can be practically applied remains unclear to many, particularly in terms of the details.

No consensus exists about what an ecosystem services approach means. Is it simply a matter of adding more ecological and/or social parameters, such as carbon sequestered in soils, water filtration capacity, recharge rates of underground aquifers, or income for local communities? Or are ecosystem services applications fundamentally about a systems approach, and understanding relationships between and across multiple indicators?

Despite this NGO debate, ecologists' work on ecosystem services is clear that the concept is fundamentally about systems thinking, such as evidenced in the Millennium Ecosystem Assessment's scientific reports. The challenge is that a range of new data and processes are likely to be needed for implementation of ecosystem services assessments in many corporate contexts, as business representatives assert in Box 7. The question then becomes: what is realistic to expect in terms of data, analytical approaches and models for understanding those data, and all the other elements essential for turning data into information that can be factored into decision-making processes? The inherent analytical and practical complexity of understanding and responding to change around any

Box 7: What is the Emerging thinking on Key Components of an Ecosystem Services Approach?

- » Inclusion of the full suite of ecosystem services in a project's area of influence (though definitions may vary)
- » Examination of local ecosystem dynamics (functions and processes over relevant time and spatial scales) as they deliver ecosystem services
- » Inclusion of the full range of beneficiaries, nature of benefits, and degree of dependence, and use
- » All potentially significant project impacts and dependencies
- » All potentially significant anticipated non-project drivers of change in ecosystem services and associated ecosystems
- » Potential project and business risks and opportunities

Source: BSR's 2012 interviews, survey, and roundtable discussions with ecosystem services thought leaders

complex issue suggests that shifts in requirements and behaviors are likely to be incremental, including in this case of driving ecosystem services assessments and thinking into corporate decision-making processes.

These challenges have led to a number of early initiatives that are focused on using practitioner forums to build best practices. Examples include national accounts and developing approaches to valuation, such as through the World Bank [WAVES partnership](#) and national initiatives, including [Canada's Measuring Ecosystem Goods and Services \(MEGS\) project](#). In addition, work is underway on corporate accounts by [PUMA](#), in the form of Environmental Profit and Loss (EP&L) and [Dow](#), in their work on "the economics of ecosystems." Also at a corporate scale, the World Resources Institute's (WRI) is currently developing a [tool](#) to integrate ecosystem services into ESIA's. All of these efforts are grappling with such questions as: *What do we measure? How? At what cost? And with what analytical methods to assess risks and impacts and consider trade-offs?*

These fundamental questions about ecosystem services appear simple. However, it is challenging to lay out the dynamic, complex processes that give rise to ecosystem services, particularly while factoring in the uncertainties around human impacts on and use of those services, over time and across geographies. A systems-focused approach that is contingent on understanding and making projections about multiple biological, hydrological, social, and economic processes begins to risk producing uncertain or even speculative results.

Thus, in discussing ecosystem services, a number of BSR's 2012 interviewees, survey respondents, and roundtable participants noted that, despite the growing activity, ecosystem services concepts could yield little by way of far-reaching applications and perhaps effectively collapse under the weight of their perceived complexity and jargon. Politician and business leaders alike often find it easier to respond to crises than to proactively plan for potential future risks. As a financial analyst who has been tracking environmental and social issues for years observed in a 2012 BSR survey response:

The more we stress our ecosystems, the more likely it is that we will have to start thinking about and addressing the problems of declining ecosystem services, or go the way of the Easter Islanders.

Progress as a whole is gradual, and sadly, it is usually a response to a crisis (a very poor crucible for sound decision making), so we will probably continue to see what we have seen: increasing numbers of species proposed for endangered species listing, increasingly vitriolic fights over whether specific habitats will be protected, and increasing numbers of fisheries collapsing with either ineffective national quotas or just a lot of diplomatic wrangling on the international level. Addressing ecosystem productivity is something that does not get done very well on a crisis-by-crisis basis, but sadly, this is the major mechanism for making any progress at all for the foreseeable future.

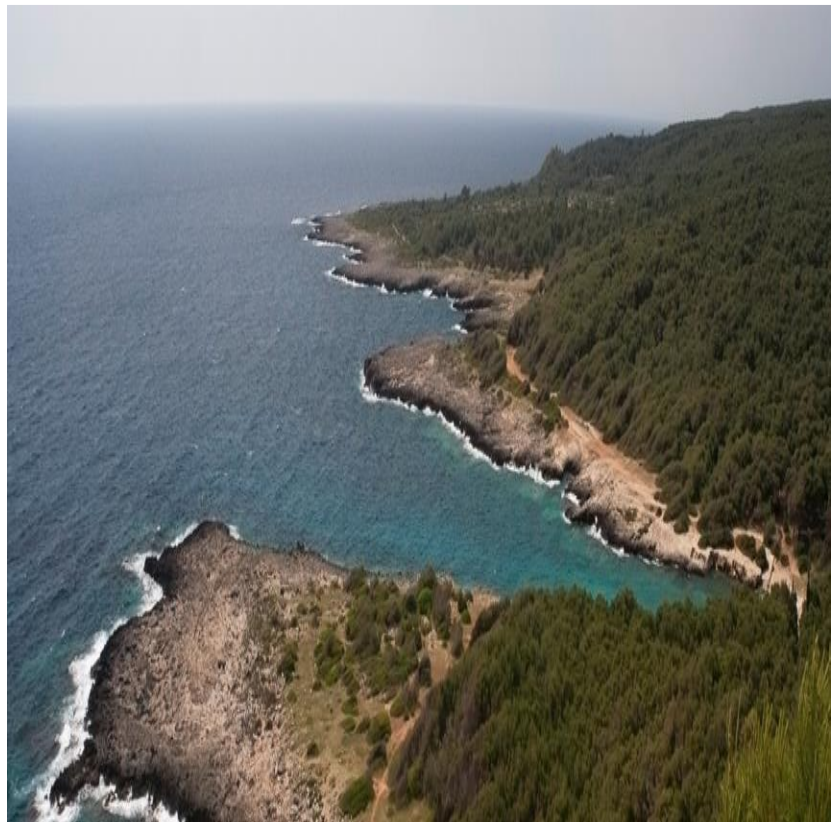
Looking forward, uptake of ecosystem services will require broad-based agreement among credible, respected institutions on essential ecosystem services indicators and analytical approaches. Table 3 lays out some of the pending questions.

Table 3: Illustrative Process-Related Challenges to the Uptake of Ecosystem Services Concepts and Approaches

Challenge	Detailed Question(s)	Illustrative Example
Definitive list of ecosystem services categories and parameters to measure	<p>Will the approach be holistic or focus on a subset of ecosystem services (e.g., carbon, water, etc.)?</p> <p>What is the consensus on a set of categories of ecosystem services, as well as the list of parameters that need to be measured?</p> <p>Is there consistent terminology? And is there a definite list of parameters to measure, as well as methods for measurement?</p> <p>What is the ideal list of ecosystem services parameters? What is sufficient (though not ideal) when data is missing?</p>	<p>Somewhat overlapping but distinct categorization schemes and lists of parameters have been offered in:</p> <ul style="list-style-type: none"> • MEA • TEEB • The U.S. Environmental Protection Agency's (EPA) "Final Ecosystem Goods and Services" • The EEA's work on ecosystem services
Data and data-gathering methods	<p>What is the consensus on data-gathering methods for the parameters (as per question above)?</p> <p>Does data exist for agreed-upon parameters in key geographic areas? If so, has it been verified and ground-truthed? Is it publicly available?</p> <p>What do we do when data is unavailable?</p> <p>Who is responsible for collecting what data? How much data is needed?</p>	<p>Numerous methods exist across the full range of tools for analyzing ecosystem services, as documented in past BSR reports comparing current tools.</p>
Monetary valuation	<p>Are there certain elements of an ecosystem services assessment approach that would be measured but not necessarily valued in monetary terms (e.g., biodiversity)?</p> <p>What methods for valuing ecosystem services should be used? What is the process of verifying and validating these methods?</p> <p>Are these methods compatible with business accounting methods? If not, how can they be made compatible?</p>	<p>A range of valuation approaches exist, as summarized in various academic articles, as well as summarizing websites.</p> <p>In addition, purpose-built approaches for private sector applications exist, such as the World Business Council on Sustainable Development's (WBCSD) Corporate Ecosystem Valuation (CEV) approach.</p>

Assessment	What is the approach to considering trade-offs between ecosystem services? And/or between ecosystem services and biodiversity loss?	As above, numerous methods exist for analyzing ecosystem services, as documented in past BSR reports comparing current tools.
Integration into current organizational processes	<p>What is the best way to integrate these analyses into current organizational processes? Will different processes be required?</p> <p>If so, will taking an ecosystem services approach require companies to do something different from what they already do? If so, will it add enough value to justify new tasks?</p>	This area has significant opportunities for future work.

Overall, the state of play of ecosystem services uptake is in flux. It could trend upward, remain a niche issue, or even gradually disappear, depending on many different factors and actions around the world.



Scenarios: How Could Ecosystem Services Concepts Play Out by 2025?

In light of all the uncertainties surrounding ecosystem services concepts, we felt it would be valuable to develop a set of scenarios that would capture this issue's range of possible evolutions. The scenarios are intended to help corporate decision-makers, as well as those in other sectors, consider options for positioning themselves on ecosystem services in both the short and long term.

Based on survey responses, interviews, and brainstorming discussions over the course of the two-day roundtable convened by BSR's Ecosystem Services Working Group, we developed three scenarios. Inspired by past "[transformative scenario planning](#)" work, each scenario was given a short evocative name that was resonant with sights during a field trip to the headwaters of the Florida Everglades during BSR's October 2012 roundtable meeting.

Scenario 1: Eagle Hunt

Action from regulators, public agency managers, pension fund managers, insurance company leaders, activists, and others drive a growing set of uncoordinated, ad hoc activity, requests, and even requirements on biodiversity and ecosystem services that ultimately permeates all aspects of corporate performance measures, reporting, accounting, and stakeholder engagement. It is driven by demands for disclosure and rapid dissemination of information through social media, among other methods. Corporate decision-makers are reactive and thus find themselves presented with a set of challenging circumstances and an approach that can be characterized as moving from one burning platform to another.

The years between 2012 and 2017 are marked by a growing number of extreme weather events, with major metropolitan areas around the world shut down for weeks at a time. Clean up and rebuilding requires considerable investment following increasingly ferocious hurricanes, cyclones, or other natural disasters. At the same time grain prices and other agricultural commodity prices rise, as yields drop globally due to various weather events.

In reaction to the emerging situation, both governments and citizens demand investment in natural (or green) infrastructure—in the form of protections afforded by coastal mangroves, large swaths of forest that can help to regulate water flows (as opposed to soil erosion which causes deluges) while also offering natural controls on crop-destroying insects (in the form of healthy bird populations), and the other benefits associated with well-functioning systems.¹

In response, Brazil, China, Ghana, Peru, South Africa, South Korea, Vietnam, and other jurisdictions—possibly including the EU and United States—add

¹ In the wake of Hurricane Sandy, the opportunity to use natural protective infrastructure is already emerging in the conversation. For example, as described in an *Environmental Leader* article: "The NYS 2100 commission, one of four panels appointed by New York Governor Andrew Cuomo in the aftermath of Sandy, issued a draft report last week proposing a number of changes to protect the area from future super storms that could impact utilities, railways, wastewater treatment, and the state's shoreline. The commission proposed adding storm-surge barriers to protect New York Harbor and recommended adding green-infrastructure features, such as dunes, wetlands, and oyster beds, to the state's industrial shoreline to help infiltrate, evaporate, retain, or reuse storm water." "Developers Rethink Buildings Post-Sandy," *Environmental Leader*, January 14, 2013, www.environmentalleader.com/2013/01/14/developers-rethink-buildings-post-sandy.

stringent regulations focused on restoring and maintaining ecosystem services. These regulations focus on (1) *regulating services*, as defined by the Millennium Ecosystem Assessment to include climate change, flood regulation, and other services as well as (2) *supporting services*, which includes nutrient cycling among other services. These regulations are based on specific, desired ecological states that are commonly calibrated to estimates from preindustrial periods.

In this scenario, corporate siting of, and licensing for new projects and facilities, as well as expansions of existing sites, becomes much more complex and arduous. Maintaining corporate operations and supply chains is increasingly difficult, particularly in areas deemed by governments (or other influential stakeholders) as critical to ensuring the flows of important ecosystem services in particular geographies. Companies increasingly have to gather a significant amount of new information to respond to inquiries from regulatory agencies in the United States and Europe, as well as by activist NGOs in developing nations.

Globally, pension funds and insurance companies demand more corporate disclosure related to biodiversity and ecosystem services impacts and dependencies, particularly requesting:

- » **full carbon accounting**, including the effects of construction on soil carbon (as well as water filtration and recharge rates);
- » **water use, water sources, and availability over time**, based on both historic and climate-change-calibrated projections of future above- and underground sources;
- » **biodiversity presence and impacts over time**, in terms of genetic diversity, habitat, and species, as well as
- » **site disturbance and effect on water filtration, flood control, and erosion**, among other variables.

Stakeholders are increasingly assembling all of these variables within spatially explicit computer models that can factor in climate change projections over time to assess full risk profiles and prompt discussions about how to mitigate risks. New players begin to engage to refine analyses, such as [Sustainalytics](#) through [MSCI](#), [PwC](#), [Global Footprint Network](#), [Harvest Mark](#), [Historic Futures](#)’ STRING software, and [ARAVO](#). This work is increasingly covered by [Bloomberg](#) and leverages “cloud computing” thereby allowing multiple users around the world to access information easily and flexibly.

Investors and insurance companies hire geographic information systems (GIS) experts. Businesses partner with Microsoft’s [Bing](#) and [Google Earth](#) to offer online maps of select ecosystem services around the world, such as areas with significant carbon sequestration, key areas of water filtration, underground aquifers, among others. These maps are based on credible sources of coarse-grain information. Online maps are linked to data sets that have been put together using National Aeronautics and Space Administration ([NASA](#)) and European Space Agency ([ESA](#)) satellite data and remote sensing, as well as by a range of academic institutions that can offer more fine-grained analysis that has been ground-truthed. This work has been made possible by significant donations of funds from information technology industry billionaires’ philanthropic foundations, which begin investing in cloud computing for biodiversity and ecosystem services monitoring and rapid response.

Investors begin to divest from companies that they perceive will be unable to manage risks presented by ecosystem services impacts and dependencies. The identification of specific companies draws on years of work within the socially responsible investing (SRI) domain, as well as recent industry-specific analyses, such as the Natural Value Initiative ([NVI](#)).

Activist networks (such as 350.org) increasingly link their work on specific issues to the broader set of ecosystem services and dynamic ecological systems. They leverage social media to form small, flexible, relatively flat organizations with global reach and the ability to mobilize quickly around focused actions. Online consumer information sources, such as [GoodGuide.com](https://www.goodguide.com/), are partners in campaigns that ask consumers to stop buying from some companies that activists, and sometimes investors, identify as too risky for society to continue to support. Overall, activists increasingly focus on *dynamics among multiple issues*, rather than single issues, particularly the relationships among climate, water availability, and food. Several NGOs collaborate with technologists to create their own maps to creatively display implications of today's corporate action on the expected flows of key ecosystem services in particular geographies over time. These visual displays of information drive large-scale consumer action buy-cotts, which translate into plummeting sales and market share for targeted companies.

In response, corporate actors must spend increasing amounts of time and money to assess their impacts and comply with new regulations and stakeholders' requests, while staying ahead of potential impacts on sales and brand. In some areas operations are shut down, leaving a wake of stranded assets. Corporate managers find it increasingly challenging to get out in front of the issue and proactively manage ecosystem services impacts and dependencies, as well as effects on the business.

Scenario 2: Raccoon Crawl

Activity on ecosystem services continues to occur in all sectors, but there is no critical mass for large-scale, meaningful change in private sector behaviors related to ecosystem services.

Academics and NGOs continue to advocate for an expanded frame for measuring and assessing corporate impacts and dependencies on natural systems. However, there is no clear case that an ecosystem services approach offers added value or new insights. In addition, there is no consensus on the most credible and effective ways to implement such ecosystem services measurement and assessment approaches within companies. Public sector agencies continue to fund research related to the concepts, but there is no clear pathway to the uptake of research through policy or regulations.

Therefore, the cost-benefit analysis of adopting significantly expanded ecosystem services parameters and analytical approaches is not persuasive to corporate decision makers. Corporate managers make slight adjustments to their environmental and social impact assessment (ESIA) processes and life-cycle assessments (LCAs), but these changes are relatively minor in terms of time, cost, and the insights delivered.

Overall, ecosystem services concepts fade from discussion, as conceptual and institutional complexity combine with inertia and thought leaders' inability to galvanize attention around on ecosystem services issues. The end result is that companies are not required to make any real changes.





Scenario 3: Egret Flight

Industry perceives that there is growing support for systems-focused ecosystem services assessments. In an effort to shape pathways to uptake, a critical mass of private sector firms proactively engages with public sector, NGO, and academic players—through a focused NGO- or multilateral mediated approach—to define and implement demonstrations that explore proof of the ecosystem services concept in both: (1) a data-rich site (such as in the U.S. or Europe) and (2) a site with relatively little data (such as an African, Latin American, and/or Asian site). This application of an ideal ecosystem services assessment generates discussion around the best practices, as well as an understanding of the distinction between corporate business as usual and an ecosystem services approach. It becomes clear that a systems-based approach is distinct from business as usual, but this approach requires significant supporting infrastructure, particularly in terms of data availability and spatially explicit modeling to assess and discuss trade-offs. Support for the new data and infrastructure is forged in the process as a true collaboration of multiple public, private, NGO, and academic players. Overall, the process results in pathways forward to identify and increasingly address risks as well as effectively achieve objectives important to the public, private, multilateral, and NGO sectors.

A relatively small set of corporate environmental managers across industries have been tracking ecosystem services issues for almost ten years and perceive that momentum is building in key investor, financial services, and NGO domains. The issue is moving from an emerging one to a full-fledged concept with increasingly well-defined application domains.

Over the past few years, these individuals have also been quietly spearheading small-scale pilot testing of ecosystem services concepts in their own companies. They have been trying to identify and understand the significance of any difference between current approaches to measuring, analyzing, and reporting on environmental parameters and what they may need to undertake if the most expansive approaches to ecosystems services were widely embraced.

These efforts have pointed to existing corporate environmental and social practices as the best entry point for large-scale applications of ecosystem services concepts in a company. For example, a company's preexisting environmental or biodiversity strategy, environmental and social risk assessment processes, or continual performance improvement commitments have been used to catalyze discussion around ecosystem services. Corporate managers are, therefore, open to fine-tuning such processes and protocols to include ecosystem services parameters.

At an operational level, case studies that illustrate how integrating ecosystem services into ESHIAs can lead to new insights are assembled and published. Investor due diligence processes that include ecosystem services are particularly helpful in indicating how best practice is evolving. At the same time, case studies of applying an ecosystem services lens to site remediation highlight considerable risks and opportunities.

New in-house private sector experiments are launched, particularly where carbon sequestration, water availability, and/or biodiversity concerns exist and where stakeholders are already focused on some subset of ecosystem services issues. In these cases, ecosystem services concepts are shown to be effective in defining how a company's practices can help the business to identify issues and assess options in productive interactions with stakeholders. Metrics and reporting measures are relevant and locally calibrated to particular ecosystems and socioeconomic settings, rather than driving toward a uniform set developed by national or global organizations.

Overall, persuasive case studies and a body of practice emerges, rather than a standardized set of metrics. A number of the pilot tests reveal a feasible pathway forward in corporate applications of key ecosystem concepts. Case studies document that such applications generate new insights on risks and opportunities and are not too costly if they are well meshed with existing corporate environmental and social processes. However, it is clear that public sector, academic, and NGO advocates of ecosystem services approaches do not have the in-depth knowledge of corporate processes to be able to identify the most appropriate and cost-effective points at which to mesh current businesses practices and potential future ecosystem services approaches.

In response, a group of these companies works with NGOs, multilateral organizations, or other entities to convene a larger set of businesses to effectively engage with public sector players, NGOs, and academics. The objective is to jointly craft an ambitious learning-laboratory initiative focused on exploration of how an ecosystem services approach could feasibly be applied in two illustrative landscapes. One would be in Europe or the United States, with access to verified, long-term data, and the second in Latin America, Asia, or Africa, with little available (and no verified) data. The pilot tests are designed to be a highly adaptive processes based on sound science. As industry steps forward to proactively gain experience with applying ecosystem services concepts in private sector settings, a set of best practices emerge.

This ecosystem services learning-laboratory process, which actively engages the private sector, is widely accepted by governments, NGOs, and the scientific community, as well as by the industry players involved. It seeds a collaborative process to encourage investment in natural or green infrastructure as well as the restoration and maintenance of ecosystem services. For example, companies that depend on reliable flows of water, or public utilities that rely upon forested watersheds for drinking water increasingly become interested in investing in land management practices that benefit their bottom line or help them meet environmental objectives. Public-private partnerships are forged and implemented.

The results are a series of demonstrations that investments in ecosystem services maintenance and restoration can make sound economic sense for companies under the right conditions. These demonstrations inform the development of well-accepted (i.e., peer-reviewed and broadly adopted in the scientific and regulatory communities) procedures to (a) identify, (b) characterize, (c) quantify or measure, (d) value (including both monetary and nonmonetary measures), and (e) assess the relative status (status quo, improving, or declining) and effects of proposed activities related to ecosystem services that had heretofore been nonexistent or incompletely developed. Overall, this work validates the importance of both bottom-up interest in using this new understanding of ecosystem services and a top-down commitment to a more holistic management approach within organizations engaging on ecosystem services.

By 2025, there is substantial capacity to perform ecosystem services assessments in the private and public sectors. A wide range of methods, models, and databases are in place to allow the measurement and monitoring of ecosystem services that provide support and detailed analysis. University programs are delivering trained professionals. Coherent government policies and supporting regulations have evolved to include or allow ecosystem services as a compliance or performance target, and supporting criteria to measure and assess ecosystem services performance are in place.

Many governments around the world have come to recognize the value of ecosystem services in their economies and integrate natural capital into their GDP calculations. The majority of the multinational companies have adopted

methods to incorporate the value of ecosystem services into corporate financial accounting.

Looking back, it is evident that, in many ways, that this pathway was carved through collaborative public, private, NGO, and academic pilot testing of feasible approaches. The net result is that an approach has been developed and applied that informs landscape-scale planning to address biodiversity, water, carbon, and other relevant services; helps prioritize conservation investments; steers development away from sensitive areas; and supports companies' efforts to improve their environmental and social decision making and outcomes.



Looking Forward

All of the identified scenarios have been deemed feasible by the thought leaders who collaborated to create them over the past months, through the BSR research process. Whether one proves more likely than another will depend on a host of factors, including driving forces and key uncertainties, that will influence the nature and timing of ecosystem services concepts and approaches in countries around the world.

Nonetheless, what plays out in the coming years with respect to ecosystem services is being decided now—through action and advocacy or inaction and lack of investment. The question is whose action and whose investment will be most influential and to what end?

The future is only now being written. Whether the proverbial eagle will fly and pluck hapless prey out of the water, the raccoon will crawl forward to carry on with business as usual, or a flock of egrets will easily lift off and fly together remains to be seen. The time for engagement is now, particularly by organizations that see value in positioning themselves to collaborate and create a future in which both business and valuable ecosystem services will thrive.

Appendix 1: Illustrative List of NGOs Engaging with Ecosystem Services

Organization	Illustrative Initiative(s)
Center for International Forestry Research (CIFOR)	Research on ecosystem services and payments for ecosystem services (PES): www.cifor.org/online-library/browse/view-publication/publication/3500.html and www.cifor.org/pes/_ref/home/index.htm .
CSIRO	Research on applying ecosystem services and PES: www.cse.csiro.au/research/ecosystemservices.htm .
Conservation International	Collaborating to develop ecosystem services tools, such as ARIES, and designing and implementing PES and other projects: www.conservation.org/Documents/CI_Ecosystemservices_Brochure.pdf .
Defenders of Wildlife	Collaborating with public and private sectors to develop habitat, biodiversity, and ecological integrity measures that apply across jurisdictions and scales. Maintains a portal on the Conservation Registry called Marketplace for Nature: http://marketplace.conservationregistry.org/ . Also initiated and generated support for ecosystem services legislation in Oregon that passed in 2011: www.leg.state.or.us/09reg/measpdf/sb0500.dir/sb0513.en.pdf .
Earth Watch	Research includes four initiatives: [1] biodiversity conservation: enhancing biodiversity conservation through effective landscape management; [2] sustainable agriculture: researching alternative land management plans in order to maintain sustainable farming practices; [3] sustainable forestry: maintaining ecosystem services and biological diversity in productive forests, and [4] freshwater: improving the availability and quality of freshwater for communities and wildlife. www.earthwatch.org/aboutus/research/research_areas/area_ecosystems/
The Ecosystem Marketplace	Leading source of news, data, and analytics on markets and PES (such as water quality, carbon sequestration, and biodiversity): www.ecosystemmarketplace.com/ .
Flora and Fauna International	Natural Value Initiative (NVI): www.fauna-flora.org/initiatives/nvi/
Forest Trends	Focused on creating and capturing market values for ecosystem services and supporting innovative projects and companies that are developing these markets: www.forest-trends.org/ .
IUCN	Collaborator on The Economics of Ecosystems and Biodiversity (TEEB) and Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), among other initiatives related to ecosystem services: http://iucn.org/about/work/programmes/global_policy/gpu_what_we_do/ipbes/ , www.iucn.org/about/work/programmes/environmental_law/elb_work/elb_work_issues/elb_work_ecosystem/ , and www.iucn.org/about/union/commissions/cem/cem_work/cem_services/ .
The Nature Conservancy	Collaborating to develop ecosystem services tools, such as InVEST, and designing and implementing water funds in Latin America and other projects around the world: www.nature.org/ourscience/ecosystem-services.xml .
World Business Council on Sustainable Development (WBCSD)	Collaborated on developing tools (ESR and CEV) and numerous reports and training materials: www.wbcd.org/work-program/ecosystems.aspx .
World Resources Institute (WRI)	Collaborated on developing tools, such as ESR, and numerous reports: www.wri.org/project/mainstreaming-ecosystem-services .
WWF	Collaborating to develop ecosystem services tools, such as InVEST, and designing and implementing ecosystem services projects around the world: http://worldwildlife.org/projects/the-natural-capital-project .

Appendix 2: Research Design and Methods

This paper is based on primary research, in the form of:

- » **Twenty-eight one-on-one semi-structured interviews, conducted in 2011 and 2012**, with BSR's ecosystem services subject matter lead, Sissel Waage, and corporate leaders who are engaged with the issue, following their response to an email request sent to corporate contacts of:
 - BSR's Ecosystem Services Working Group (ESWG),
 - World Resources Institute's Mainstreaming Ecosystem Services Initiatives ([MESI](#)), who were contacted by the WRI staff member forwarding BSR's email asking for an interview,
 - World Business Council on Sustainable Development's ([WBCSD](#)) Ecosystems Team, who were contacted by a WBCSD staff member who forwarded a BSR email asking for an interview,
 - the Wildlife Habitat Council's ([WHC](#)) Ecosystem Services Working Group, who were contacted by a WHC staff member who forwarded an email request for a BSR interview request, and
 - online research that identified additional companies and individuals within the private sector who are engaged with the issue.
- » **Thirty-eight written survey responses in the summer and fall of 2012** to questions about current activity and future uptake of ecosystem services concepts by private, public, NGO, multilateral, and academic representatives (for the specific questions, please see Appendix 5);
- » **Internet-based research** of publicly available corporate communications related to their actions on ecosystem services that was undertaken in the fall of 2011 and winter of 2012; and
- » **Quotes from 64 individuals who participated in BSR's ESWG roundtables that were held in September 2011 and October 2012**, both of which were governed by the Chatham House Rules, in which people speak as individuals instead of as representatives of their organizations and in which a coarse-grain explanation of a speaker (e.g., public sector employee, private sector employee, NGO representative, etc.) is used instead of an individual attribution.

The semi-structured interviews followed the highest academic standards, as laid out in research methods books on the topic.² All of the interviews were conducted by the same BSR point person, Sissel Waage, who has conducted several hundred semi-structured interviews since her experience began with conducting primary research in 1996, while her in doctoral program at the University of California, Berkeley. In her doctoral research, she conducted more than 110 semi-structured interviews, with the vast majority held in person while she lived in a rural community field site for 16 months. After completion of her PhD, she conducted dozens of interviews for her research and publications at The Natural Step, Forest Trends, and BSR to inform other publications about ecosystem services, as well as climate change and other topics.

Drawing on this extensive experience with semi-structured interview protocol and practice, the lead researcher on this project began by drafting an interview guide that included a detailed list of questions, as are listed below. This interview guide was sent, via email, for review by BSR's ESWG corporate members to ensure that it would yield information that was of interest to the primary target audience: corporate decision makers. Additional questions and word choices were suggested. The lead researcher then edited and finalized the interview guide.

Outreach via email began to the list of corporate decision makers via the four primary networks listed in the bulleted list above. Many corporate leaders did not respond to an initial email. A second email was sent. When corporate representatives replied, the BSR lead researcher responded with an email requesting a telephone interview.

All semi-structured interviews were conducted on the telephone. The BSR interviewer followed the set of written questions as an interview guide, rather than a strict ordering. That is, she asked all questions with identical phrasing and words. However, the order of questions shifted from one interview to another to allowed her to have a conversation with the interviewee. This approach has been found in academic research (as per the books cited earlier) to yield robust findings, while not leading the interviewee or tainting findings with the interviewer's preexisting notions. Rather, semi-structured interviews include attention

² For example, see: Lindlof, Thomas, and Bryan Taylor, [Qualitative Communication Research Methods](#), SAGE Publications, 2010 and Wengraf, Tom, [Qualitative Research Interviewing](#), SAGE Publications, 2001.

to following up on interviewees' framing, key words, and discussions. Open-ended questions and requests for elaboration—often through repeating the last word from an interviewee with an upward inflection on the interviewer's voice to indicate a question and request for elaboration. By the end of the interview, all questions and topics have been covered, though the order varied from one interview to another.

In terms of the scope of the internet-based research, we used www.google.com, www.bing.com, and other search engines to identify the full range of business activity on ecosystem services, from mentions of the issues within environmental or sustainability reports through formal corporate policies passed. It is noteworthy that this research is based on the publicly available information shared by companies. As a result, the list of corporate activity may *not* include all company action related to ecosystem services. A number of businesses are engaging with ecosystem services issues, but are not yet discussing their work publicly.

It is essential to note that the internet research focused on ecosystem services and did *not* include companies active on biodiversity alone. It is also noteworthy that given the scope, budget, and time of this research, the documentation is in the form of direct quotes from corporate materials. Independent verification and validation of these assertions was not undertaken and lay beyond the scope of this particular research project.

Finally, the September 2011 and October 2012 roundtable discussions were convened by BSR's ESWG and designed as well as facilitated by the lead researcher. Agendas were crafted months in advance and shaped based on feedback from both BSR's ESWG's corporate members, as well as invitees from the public, private, NGO, multilateral, and academic sectors. The facilitation approach was similar to that used in conducting semi-structured interviews.

If you have questions about this report's research methods, please contact Sissel Waage at swaage@bsr.org.

Appendix 3: 2011 Semi-Structured Interview Questions

Interviews were conducted using semi-structured interview protocols, with the assurance that the research would be synthesized and reported in an anonymous (unattributed) review of corporate applications of ecosystem services concepts and tools. The set of questions—which were not followed in a linear fashion for all discussions, but rather used as a guide for the interviewer so that the interviewee felt that there was a dialogue on the topic—included:

1. Please tell me about your company's engagement with ecosystem services to date.
 - a. When did you begin to apply ecosystem services concepts within your company?
 - b. Why?
 - c. How and in what ways? At what scale?
 - d. To what parts of the business?
 - e. With what supporting rationale or business case?
2. Have you applied any specific ecosystem services tools? Why or why not?
 - a. Which tools? Why were these tools selected? Were there key characteristics for which you looked in tools? Do you have screens for selecting tools? If so, can you share the list with us?
3. How were these tools applied?
 - a. In what business contexts? During which decision-making processes? (Why?)
 - b. Did you try to mesh current corporate decision-making processes with these new ecosystem services tools? Why (or why not)? If so, with what findings and results particularly with regard to the value add of ecosystem services tools?
 - c. Were the findings from ecosystem services tool application findings directly used in making business decisions? If so, why and how? And did the findings change the outcome of the business decision? If not, why not?
4. What challenges have you seen in implementation of ecosystem services tools?
 - a. What have been the key challenges and/or barriers?
 - b. What surprised you?
 - c. How did you overcome challenges?
 - d. What are the lessons learned?
5. What are the costs (e.g., time, money, need for experts) associated with tool application?
 - a. What was the cost breakdown (e.g., staff time, consultants, data sets, etc.)?
 - b. Would these costs decrease over time?
 - c. What is the cost to benefit ratio of applying these tools based on your experience to date?
6. Can you tell me about your final assessment of each of the tools that you applied? What were key parameters by which you judged the effectiveness of the tool? How did the tool fare according to these parameters? What changes would you suggest making to the tool in order to increase its effectiveness over time?
7. What best practices have you identified to date related to: Applying ecosystem services concepts and/or tools? Integrating ecosystem services concepts into key environmental management processes?
8. Do these best practices relate to meshing tools within preexisting processes, such as: ESIA? Landscape-level planning? Marine spatial planning? Others? If so, what are the best practices that you have found or developed to date?
9. How have you built the business case internally for applying ecosystem services concepts and tools? Has this business case been effective for mobilizing resources? Was it strengthened or weakened by your pilot test applications of ecosystem services tools to date?
10. What components of the business case remain unanswered? How will these be addressed?
11. What are the lessons that you have learned about applying ecosystem services concepts and tools within your business? Please illustrate each lesson with examples. What was the biggest unforeseen obstacle encountered? What lessons have you learned about project support? What lessons have you learned about the costs and relative value of insights garnered?
12. Will ecosystem services concepts (and/or tools) be applied more widely in your business in the future? If so, why? What are the primary drivers? If not, why not?
13. Will the tools be able to support the complexity of larger projects? With what cost implications?
14. Are there other finance, design, or operational approaches that could be employed to improve the possibility of scaling? If so, what are they?
15. Is there anything that I have not asked that you would like me to know?

Appendix 4: 2012 Survey Questions for Private Sector Representatives

As with all roundtables convened by BSR's Ecosystem Services Working Group (ESWG), the BSR team prepared a pre-event packet for reading prior to the event. This packet included responses to an unattributed (anonymous) synthesis of a pre-event survey that was sent to all ESGW members and invited participants—as well as select thought leaders in the field who are unable to attend the roundtable—which included the questions listed below.

In accordance with the Chatham House Rules approach to the roundtable, the responses were documented *without* attribution or any mention of individual respondents or institutions, that is anonymously. This synthesis of all participants' input—in aggregate without attributions—provided a snapshot of the viewpoints present in the discussion and accelerated the conversation to more in-depth topics quickly. The survey questions were as follows:

Is your company actively exploring, or engaging with, ecosystem services issues?

If not, why not?

If so:

1. What definition is being used within your company for ecosystem services?
2. What initiatives and actions have been launched?
 - a. What are the goals and objectives, including whether it is related to environmental performance, social performance, or both?
 - b. With what approximate budget(s)?
3. Why has this work been launched at this point of time, in terms of both the biophysical and socioeconomic business case?
 - a. With what specific internal drivers or business case elements?
 - b. Is this business case internally perceived as a compelling case for action?
 - c. Why or why not?
4. What part(s) of the company is (are) engaged with ecosystem services?
 - a. What numbers of people are engaged with ecosystem services within your company?
5. What processes or protocols are being examined for integration of ecosystem services (e.g., strategy, governance, operations, supply chain, siting, design, ESIA's, LCAs, etc.)?
6. What approaches and/or tools, as well as data, are being used?
 - a. What data was missing that you would need to be in place to assist you in an ecosystem services assessment?
 - b. If regional ecosystem services data sets and/or ecosystem services value estimates were available for your operations, did you use them? (Or would you have used them if they had been available?) If so, how? If not, why not?
 - c. If in-depth work has occurred, what approaches or tools were used to assess cumulative impacts on ecosystem services, particularly in light of the tendency for impact assessments to focus on discrete activities?
7. Have you used information from this ecosystem services work to make decisions?
 - a. If so, how? And what was the difference between current environmental assessment approaches, and what was undertaken for this ecosystem services work, both in terms of technical process and budget? Was this additional effort determined to be valuable or not?
8. Is your company monitoring and reporting on ecosystem services impacts and dependence?
 - a. If not, why? If so, why and how?
9. What is your overall assessment of the relative value add of an ecosystem services lens?
10. What obstacles or challenges have been encountered with applying ecosystem services concepts to work to date?
11. What are the lessons learned to date?
12. Are there specific pathways (existing or to be created) for private sector engagement with ecosystem services issues in the coming months and years? With what objective(s)?
13. Looking forward, to 2025, do you think that ecosystem services will be a part of your organization's decision-making processes?
 - a. If so, how? What do you expect you will be asked to do with ecosystem services data or information in your job? If not, why not?
14. What are your objectives in attending this meeting? What would you need to walk away with to make it a successful experience?

Appendix 5: 2012 Survey Questions for Public, NGO, Multilateral, and Academic Representatives

As with all roundtables convened by BSR's Ecosystem Services Working Group (ESWG), the BSR team prepared a pre-event packet for reading prior to the event. This packet included responses to an unattributed (anonymous) synthesis of a pre-event survey that was sent to all ESGW members and invited participants—as well as select thought leaders in the field who are unable to attend the roundtable—which included the questions listed below.

In accordance with the Chatham House Rules approach to the roundtable, the responses were documented without attribution or any mention of individual respondents or institutions, that is anonymously. This synthesis of all participants' input—in aggregate without attributions—provided a snapshot of the viewpoints present in the discussion and accelerated the conversation to more in-depth topics quickly. The survey questions were as follows:

1. How has your institution or organization explored the application of ecosystem services concepts—including analytical approaches, valuation techniques, and any other methods?
 - a. With what goal(s), objective(s), and/or rationale? Approximate budget?
 - b. Personnel allocation? Departments, divisions, or units involved?
 - c. Approach(es) and/or tool(s) considered or applied to date?
2. Have you used the information from ecosystem services work to date within decision-making processes or to evaluate proposals?
 - a. If so, how? And with what conclusions drawn about the value add of ecosystem services information?
 - b. If not, what would need to happen to make ecosystem services information an effective contribution to your decision-making processes and/or operating practices?
3. What is (are) the main challenge(s) to applying ecosystem services concepts in the present as well as looking forward?
4. What are the potential pathways forward for applying ecosystem services concepts to decision-making processes within your institution or organization?
5. Can you explain, as it is discussed in your institution:
 - a. Why and how the ecosystem services concept provides an improved basis from which to manage for environmental and social objectives, relative to current criteria?
 - b. What are distinctions between today's environmental impact assessment approaches or processes and assessing ecosystem services impacts and dependencies?
6. What are the potential regulatory implications of ecosystem services?
 - a. For example, how would uptake of ecosystem services measurement impact occur in environmental, social, and health impact assessments (ESIAs, ESHIAs, etc.)?
 - b. What are the potential regulatory changes that could stem from ecosystem services uptake?
 - c. How do you see the process of regulatory uptake occurring?
 - d. How may this process differ in countries with robust environmental regulatory structures versus nations with a less developed regulatory program?
7. In the short- to midterm, will ecosystem services fit into policy and regulatory requirements?
 - a. If so, where? If not why not?
 - b. Is this assessment unique to your institution or likely to be fairly common?
8. Overall, based on your institution's current work on ecosystem services, what do you believe will be the future uptake of ecosystem services, in 5 years? 10 years? 15 years?
9. Are there potential scenarios that you would suggest may and or may not be viable looking forward in terms of ecosystem services within your sector?
10. Looking forward, to 2025, will ecosystem services be a part of your organization's decision-making processes?
 - a. If so, how? And what do you expect you will be asked to do with ecosystem services data or information in your job?
 - b. If not, why not?
11. What would be specific pathways in which the private sector could productively engage in the coming months and years on ecosystem services issues? With what rationale?
12. What are your objectives in attending this meeting? What would you need to walk away with to make it a successful experience?