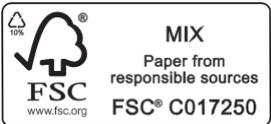


NATURE AS FOUNDATION OF ECONOMY: INVESTING IN NATURAL INFRASTRUCTURE FOR CONSERVATION SUPPORTING HUMAN DEVELOPMENT



A Periodic Report of the Aspen Institute's Dialogue Series on Conservation in the 21st Century



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The Dialogue Series on Conservation in the 21st Century is an ongoing nonpartisan dialogue on the future of conservation, society and the environment. This report, while grappling with a potentially radical shift in the current bio-centric paradigms dominating conservation thought today, does not exhaust the dialogue needed to address many of the important issues raised. Participants in the dialogue contributed their time and ideas as experts in their field; their participation does not constitute individual or organizational endorsement. As with all policy dialogues in the Aspen Institute's Energy and Environment Program, the ongoing dialogue series format follows the Institute's time-honored approach to intentional, value-based dialogue, and adheres to a strict not-for-attribution rule throughout the duration of the dialogue. Individuals who participated in the dialogue are listed for identification purposes only – they are not responsible for, nor do they or their organizations endorse, the report's narrative, conjecture or any errors.

For all inquiries, please contact:
The Aspen Institute
Suite 700
One Dupont Circle, NW
Washington, DC 20036
Phone: (202) 736-5800
Fax: (202) 467-0790

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Nature as Foundation of Economy: Investing in Natural Infrastructure for Conservation Supporting Human Development. A Periodic Report of the Aspen Institute Energy and Environment Program's Dialogue Series on Conservation in the 21st Century (2012), David Monsma, Executive Director, Energy and Environment Program, The Aspen Institute.

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PREFACE

There are 7 billion people in the world today. Each individual is striving for a better life and a higher standard of living. This inherent desire, shared by all, exponentially increases consumption of natural resources, which in turn depletes nature and alters our atmosphere. We have entered the Anthropogenic – a new geological epoch where our species exerts and is the utmost significant driving pressure on the earth’s natural resources. These pressures will only intensify as the global population approaches 9 billion by 2050.¹

There appears to be growing awareness of the interdependency between the natural world and human well-being, while a true understanding of the interconnectedness has persistently been limited to people and organizations focused on these issues. The trends at this nexus of conservation and human development have not been promising. The dichotomous approach pursued by conservation and human development organizations has demonstrated that it cannot scale up fast enough to match the pace of global change. Despite the best of intentions and official pronouncements over the years by representatives from both the humanitarian and environmental NGO communities about the need for greater cooperation, a paradigm and practice of integration and collaboration have failed to gain significant traction.

The next few decades will determine the direction and form of expanding human societies and the condition of the world we live in. The hard fact of the matter is that emerging economies will continue to grow and develop, and developed economies will continue to consume. In a crowded, heated, super-globalized world with fraying ecosystems, traditional conceptions of “economic growth” and “conservation” are outdated, and must be replaced with a practical framework that truly integrates human needs and activities with the “natural infrastructures” and ecosystems that biologically support all life on Earth.

Starting in 2010, the [Aspen Institute’s Energy and Environment Program](#) convened a core group of conservation, human development and other experts to test a working hypothesis for deliberately incorporating ecosystem services into economic development goals. One of the objectives of the dialogue was to demonstrate the value of conservation in sustaining prosperity and human well-being in the 21st century. The working “hypothesis” of the dialogue has been that if the conservation and human development communities could embrace and demonstrate shared objectives, strategies and measures of success, it would lead to a greater likelihood of positive outcomes with regard to both human development and conservation goals.

The group’s foremost finding was that the conservation movement’s central paradigm and focus on biodiversity – alone – is inadequate for ensuring the resilience of natural resources and that our civilization must now begin to invest in “natural infrastructures” at a rate and scale planned to keep pace with human and economic development. Based on the US EPA’s definition, we use natural infrastructure here to mean the “interconnected network of natural and undeveloped areas needed to maintain and support ecosystems” that provide “a wide array of environmental, health and economic benefits such as mitigating climate change impacts and sustaining clean air and water.”

Notwithstanding participant appreciation that much of the Aspen discussion traded on rhetoric and theory previously established, for instance, in the Millennium Ecosystem Assessment, there was substantial agreement that the general hypothesis of the dialogue did not go far enough towards

inspiring a truly transcendent approach to solving intransigent environmental and distributive economic problems that have plagued previous efforts for decades. On this point, the dialogue fell short of originating an entirely new discourse (or designation) to replace and solve the self-perpetuating dichotomy between development and conservation.

The dialogue participants also placed considerable weight and significance on the need to test the proof of concept – the hypothesis that an entirely new field must be defined, one that does not attempt to differentiate between the well being of people and the well being of nature. It was beyond the scope of this segment in the Aspen dialogue series to identify or agree on targeted fields or geographies to test the hypothesis, and the group (as constituted for the dialogue) did not view itself as the body to conduct this “ground-truthing” or field testing of this critical theory. It remains to be seen what is needed to demonstrate or satisfy the hypothesis by and among the intractably divergent interests of business, government, foundations and conservation organizations.

Another significant observation during the dialogue is that the general downturn in the economy, which renders governments in the US, Europe and Asia cash-strapped and, in some cases, paralyzed, means the partnership between NGOs and the private sector to jointly tackle human and environmental needs is the best current step forward. Government input is hugely influential and essential but the necessary innovation for creative collaboration will need to come from NGOs and business.

The ongoing dialogue on how to apply a truly integrated approach to conservation and human development – “a sustainable space where human needs and aspirations are met without exhausting the support the planet provides” – will continue. This report and its recommendations owe much to the considerable experience and thoughtful contributions by all of the participants in a series of Aspen Institute dialogue meetings that took place during 2010 and 2011. Although the dialogue and the production of this report were hampered by a lack of sufficient funding, we are deeply grateful to W.D. Budinger, The Rodell Foundation, Steve McCormick and The Gordon and Betty Moore Foundation for generously supporting convening portions of this segment of the dialogue series. The Aspen Institute would also like to thank The Nature Conservancy for inspiring a new narrative for conservation and acting as our thought partner for organizing this dialogue. Ray Bolger served as the rapporteur for major portions of the dialogue, deftly extracting the important themes from a wealth of complicated discussions. Special thanks to Nicole Buckley, Dave Grossman and Timothy Olson for additional editing and to Paul Grillot and Olga Georgievova.

David Monsma
Executive Director
Energy and Environment Program
The Aspen Institute

M. Sanjayan
Lead Scientist
The Nature Conservancy

FOREWORD: BEYOND CONSERVATION

“Conservation” is, by its very name, a conservative enterprise, which has traditionally sought to keep landscapes from changing or to at least change them back to the way they used to be. In North America, and in many other places, it has been motivated by a shared narrative of an ecological fall from grace and expulsion from paradise. The Earth, in this story, was a pristine wilderness, perfect and timeless, until Industrial Man and his works came and ruined everything by felling trees, damming rivers, by mining and clearing and building and poisoning and, most recently, heating. Wherever we went, our touch was ruination. The sacred charge of conservation is to save what is not yet ruined and undo as many of humanity’s changes as possible.

Although conservationists have long known that ecosystems are not static, that humanity’s influence on the Earth has stretched back thousands of years—at least to the great megafaunal extinctions—and that the scale of change is now so massive as to be effectively irreversible, we still carry this narrative with us. It is a part of our culture, central to our emotional responses to environmental change—those emotional responses that motivate us to continue the difficult and generally poorly paid work of conservation.

So it is gut wrenching to attempt to cast aside our core mission of putting things back the way they used to be. The reality revealed by science initially seems much less appealing and emotionally resonant: ecosystems are dynamic by nature, hyper-dynamic in the current Anthropocene epoch and almost certainly impossible to lash to our favorite historical Edenic states except in tiny reserves at great expense. We can’t go back. But once the mourning for the great pristine ideal is done, the facts turn out to be a liberation.

No longer must we struggle against inevitable change, clinging to scraps of so-called pristine wilderness and fighting a battle we know we will lose. Instead of reactionary, defensive fighting for past states, we can begin to work proactively, even creatively. We can take on new goals, make more nature. We can promote biodiversity, expand green spaces, bring nature to cities, embrace emerging ecosystems with some nonnative species, or drive north with a truckload of seedlings to help a tree survive climate change. Perhaps we can even bring elephants to Darwin, Australia to eat the African gamba grass that starts so many fires there, as recently suggested by David Bowman.

The one goal of conservation—put it back—will be replaced by many goals, from preventing extinctions to providing resources and infrastructure for human flourishing to preserving culturally significant landscapes to building resiliency to climate change. Many of these goals will not only make the Earth greener and more alive, but also benefit us, though I personally believe that there are some things we should do just for the sake of the plants and animals, and not for anything we might get out of it.

Work done for these forward-looking goals doesn’t seem well described by the term “conservation.” It is perhaps closer to gardening, though the results won’t be as tidy or controllable as our back gardens. We could call it stewardship or nature promotion or greening or something newly coined for the purpose. Or we could worry less about the verb and more about the outcomes we can achieve: the fish to catch and eat or watch as they spawn upriver, leaving iridescent scales on the rocks; the marshlands alive with game birds and filtering water like a great rooty sponge; the forests heavy with locked-up carbon in which to spot rare birds, sleep under silent stars and get lost.

Emma Marris

Author of [Rambunctious Garden](#)

INTRODUCTION

Over the last four decades, several high-level multilateral expressions have been made in the attempt to encourage sustainable economic development that values both ecological principles and the economic aspirations of less wealthy societies (*see Appendix I*). In 1972, a United Nations meeting in Stockholm led to the **Declaration of the UN Conference on the Human Environment**, which proclaimed:

Man has a special responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, which are now gravely imperiled by a combination of factors. Nature conservation, including wildlife, must therefore receive importance in planning for [human] economic development.²

Two decades later, the **United Nations Conference on Environment and Development** (“Earth Summit”) - held in Rio de Janeiro - led to the adoption by 178 governments of “Agenda 21,” an all but forgotten program of sustainable development goals to be addressed independently by individual nations to eliminate poverty and integrate environment and development into policy choices and decision-making.

More recently, the **Millennium Development Goals**³ (MDGs) provided inspirational milestones for everyone working to make a better world. Yet despite years of effort and investment, anyone who has tracked progress towards these goals has to conclude that we are far from meeting them by 2015 or anytime in the next 25 years.

Despite agreements such as the Millennium Development Goals, and the extraordinary dedication, for example, of the authors and proponents of the **Millennium Ecosystem Assessment** (MA) and, more recently, **The Economics of Ecosystems and Biodiversity** (TEEB), the course of recent history in terms of actual environmental outcomes globally suggests that the bulk of modern conservation does not work:

In spite of the growing awareness of the importance of ecosystems and biodiversity to human welfare, loss of biodiversity and degradation of ecosystems still continue on a large scale. Fundamental changes are needed in the way biodiversity, ecosystems and their services are viewed and valued by society.

The release of the Millennium Ecosystem Assessment (2005) helped foster use of the concept of ecosystem services by policy makers and the business community. However, progress in its practical application in land use planning and decision making has been slow.⁴

The systematic weakness in achieving the MDGs may lie in the conservation community’s inability to address weak governance and vested interests that lead to the concentration of benefits – especially benefits drawn from natural resources – and disproportionate distribution of associated costs to the poor. Regardless, with the globalization of trade and rapid growth of human populations and economies worldwide, “conservation” as we know it will have to undergo profound changes if we are to avoid the degradation of our natural resources, from the oceans and forests to the air we breathe.

Moreover, the philosophy and science of conservation biology fall short in connecting the value of the natural world with its human inhabitants. For many, particularly in the developing world, modern conservation has come to represent a nonentity at best, or a direct challenge at worst, to their

livelihoods and aspirations for economic growth. Rarely is it seen in a beneficial light by more than a small circle of supporters. It is a source of inexorable friction between conservationists and the human development community, which otherwise could be powerful allies in the mission to support sustainable growth and a healthy environment worldwide.

It is noteworthy that **Rio+20**, the UN Conference on Sustainable Development held on the eve of releasing this report (June 20-22, 2012), presented as one of its themes the “green economy in the context of sustainable development and poverty eradication.”⁵ The Green Economy Report approach is founded on the principle that healthy ecosystems (wetlands, forests, floodplains, estuaries, etc.), rich in natural capital, underpin sustainable economies. The transition to a green economy also demands recognition of the role biodiversity and ecosystems play in human economic affairs.

The New Economic and Conservation Imperative

There is an urgent need for a new path forward that recognizes that conservation goals and development goals are better achieved when informed and supported by one another. While we must recognize that economic or development-based motivations are at times insufficient for conservation goals (such as in protecting species considered dangerous to humans), there is an urgent need and opportunity to challenge the conventional definition of economic growth, which is inherently good for people but cannot be sustained indefinitely – and to replace it with the practice of a resilient, sustainable, and equitable economy that protects ecosystem, species, and genetic diversity.

There is an urgent need for a new narrative that recognizes the necessity of getting businesses and governments to better account for the benefits that nature provides and to invest in natural infrastructure as much as in manmade infrastructure.

There is an urgent need for conservation groups, humanitarian organizations and philanthropic foundations to work more deliberately together to advance policies and large-scale action to achieve these goals – and to ensure that businesses, local peoples, and other stakeholders are involved and invested in the efforts.

Business-as-usual across the conservation movement, economic development and humanitarianism is not a viable option. The new economic and conservation imperative is the nexus between equity, environmental sustainability, and growth – as Aldo Leopold described, “a state of harmony between man and land.”⁶ We must forge a new paradigm that advances both human societies and the natural systems that support them. This responsibility to shift paradigms for a holistic focus falls not only on the conservation community, but also on all communities engaged in sustainable growth – nature and humanity must be integrated across sectors in order for sustainability and well-being to be achievable.

An Aspen Institute Dialogue is based on sincere interaction among engaged participants with diverse views in a collegial atmosphere that encourages respect for different opinions. In this setting, the Aspen Institute’s Energy and Environment Program engages dialogue participants in the process of shaping “first principles” necessary to form agreed-upon findings or recommendations, which in this case focus on the explicit link between nature and human well-being. This segment in the *Aspen Institute Dialogue Series on Conservation* identified the following initial principles as forming the foundation for asserting the recommendations found in this report:

FIRST PRINCIPLES FOR CONSERVATION AND HUMAN DEVELOPMENT DIALOGUE

- Acknowledge that humans have become the most dominant evolutionary force on the planet and that with this comes heightened responsibility, including responsibility for the well-being of future generations.
- Accept that market approaches are vital but limited solutions.
- Respect that nature has multiple, sometimes conflicting values for different people. Therefore, search for multiple pathways to develop more solutions and approaches - some local, some global.
- Make the goals and language of conservation positive and join with external groups to develop new human-focused approaches to sustaining natural capital as a central tenant of sustainability and human well-being.
- Bring light to linkages between biodiversity and human well-being while maintaining a parallel need for conservation of biodiversity, for reasons beyond human survival and well-being.

For the purposes of the dialogue, these principles formalized a new approach to conservation that will develop effective protection of natural resources by informing strategies with economic and human development needs, while maintaining that human development efforts would be more effective if integrated with conservation principles. Ultimately, the principles and the recommendations presented in this report point to the once and future imperative to invest in natural infrastructure as an integrated part of all economic and human development.

RECOMMENDATIONS IN BRIEF

In recognition of the critical role that the natural infrastructure and ecosystem services play in supporting human prosperity, this report focuses on the following major recommendations:

1. Private and public capital investments should be made in “natural infrastructure” systems, particularly those serving human communities.
2. Assessment of financial investments in natural infrastructure should incorporate ascribed value of natural services provided by existing ecosystems upon which the investments depend.
3. The use of ecosystem services assessment should be implemented in natural resource planning and development at multiple scales (including infrastructure development and resource extraction).
4. Expand upon the existing group of strategic collaborations between the private sector and government (*i.e.*, “public-private partnerships”) in critical areas for creating investments to manage, conserve and restore natural infrastructure functions for the benefit of humans and nature.
5. All investments in natural infrastructure must embrace the principle of “local ownership” to ensure consultation with and management by local peoples in order to be successful and sustainable.
6. A concentrated effort should be made by philanthropic foundations, human development organizations and conservation groups to integrate the value of natural infrastructure (and/or ecosystem services) into programs and decisions.
7. Financial institutions, rating agencies and the insurance industry should play a more active role in valuing natural infrastructures, ecosystem services and ecosystem-based management and as part of national prosperity indicators (e.g. a “green GDP”) and financial due diligence in valuing risk-adjusted capital investments in all forms of industry, commerce and economic development.

I. A NEW NARRATIVE: NATURE AS FOUNDATION OF HUMAN ECONOMY

The prevailing economic principle that has driven global development is that economic growth is good, in and of itself – and ad infinitum. Economic growth in stepwise linear fashion is necessary for human development and essential as the vehicle moving human societies toward well-being. Yet this vehicle, dependent upon nature for its movement, operates in a world where nature is finite.

All people of the world - particularly those in less wealthy societies - are seeking to better their lives, as evidenced in part by the growing “happiness industry” that has expanded beyond the developed world, in which economists, policymakers and scientists focus on the underlying causes of happiness and how governments can increase national happiness through enlightened policy. Yet global growth in well-being cannot be sustained if it does not value, price and account for the services and benefits that nature provides. If we are to grow we must grow differently. A new narrative is needed to drive sustainable economic development principles into the mainstream consciousness – a narrative that captures the causal relationships between investing in nature and long-term human prosperity.

Narrative Context: Humans as Part of Nature

Throughout human history, the future of our species like all other species on earth has been inextricably linked to the health of our ecosystems. In the last two centuries, however, the image of humans as an integral part of nature has been noticeably missing from the standard conservationist iconography. Typically, nature has been portrayed as an external phenomenon — “out there” — separate and apart from humans. The concept of nature as a thing separate from humans or something to be protected is

The notion of nature as something separate from humans has created a cultural divide between wealthy and less wealthy societies...

typical in much of the world’s developed societies. This is not as much the case in less developed economies, however, where the very notion of conservation often strikes people as exclusionary. The notion of nature as something separate from humans has created a cultural divide between wealthy and less wealthy societies, and many of the latter are situated in vulnerable ecosystems of most concern to conservationists.

A new narrative is necessary based on the premise that conservation is not about “keeping things away from people” but as sustaining the resilience of nature and its capacity to provide humans and all life on earth with the essential services they need to thrive. This does not mean that some areas of the planet, such as national parks, where the needs of wildlife are held paramount, should not be vigorously protected. Indeed they should. However, such areas should not be seen as the dominant paradigm of conservation. It remains to be seen whether the trend toward urbanization in developing countries will create a corollary trend toward a public mindset of separation of nature and society.

Narrative Challenge: Terminology

The name *conservation* itself has outlived its usefulness to some extent. The very concept of conservation should be recast with language emphasizing the resilience of nature and its capacity to provide humans with the essential services they need for survival and well being. This means promoting the *outcomes* of conservation, not necessarily the *name* conservation.

There are many terms being floated now to describe the notion of natural contributions to human society and the potential for their restoration and maintenance. The concept and term most used to capture this phenomenon is “**ecosystem services**”, but this term can be a broad one, encompassing a range of benefits such as flood control and filtration of pollution. “The concept presumes that conservation can best be achieved by explicitly linking nature to human well-being, and framing the idea of conservation in light of the services, or benefits, that any given ecosystem produces.”⁷ Awareness of the ecosystem services and what it encompasses is generally fairly low among government and businesses, many of which do not proactively consider the resources and other services that nature provides, nor their contribution to the bottom line. There are also concerns that the term “ecosystem services” does not resonate with many development organizations, policymakers or the public.

Future Narrative: Natural Infrastructure Investment

The environmental construct of “pristine” nature as something to be externalized or removed from interaction with human communities is outmoded and must be separated or removed from the modern conservation movement, its efforts and its proponents.

A possible alternative framing is to think of these benefits as “natural infrastructure.” This term may have its own drawbacks – the development community tends to think of infrastructure as something that is clearly needed but requires intensive capital and labor inputs. Businesses and the public also may not be particularly energized by the term, but “natural infrastructure” does enable a relatively easy analogy to roads, bridges, communications towers, and other traditional manmade constructs that underlie human societies – and that require investment and maintenance. Primarily for its clarity, “natural infrastructure” will be the main term employed in this report, though the use of other terms need not be forbidden.

Investing in natural infrastructure is an essential aspect of investing in long-term human development...

The world’s natural infrastructure provides much of the support on which human lives and society rely – perhaps even more so than man-made infrastructure. Rain provides irrigation of agricultural land. Trees have long been solar-powered devices that remove carbon dioxide from the atmosphere. Mangroves provide protection against coastal storm surges and nurseries for thriving fisheries. The examples go on and on. And yet humans have largely failed to invest in growing and maintaining natural infrastructure, despite even the enormous economic opportunity it represents.

Equity, public-private partnerships, municipal bonds, and other means of financing manmade infrastructure should be applied to investing in the maintenance and growth of natural infrastructure in countries around the world. Governments, businesses, and the development community for many years have created ways of building roads, water services, telecommunications, and the like; a similar framework must be applied to forests, watersheds, species, and other providers of ecosystem services. Investing in natural infrastructure is an essential aspect of investing in long-term human development and well-being, as resilient and biologically diverse ecosystems provide the capacity and support for human prosperity and health.

II. CAPTURING THE VALUE OF NATURE'S SERVICES

A key aspect of promoting investment in natural infrastructure is to utilize tools and processes that better capture the full range of cultural, regulating and provisional services provided by nature. Valuing nature can play a principle role in public management (e.g., Ecosystem-Based Management schemes), in private sector strategies (e.g., Ecosystem Services Markets) and in developing indicators and metrics.

Incorporating Nature into Public Management

Public management and policy decisions can better incorporate the value of nature's benefits by including ecosystem services in cost-benefit analyses for budgetary decision-making and policymaking at local, state and national levels, including in land management, infrastructure development, zoning, water systems and other utilizes development. Beyond this, ecosystem-based management systems offer strategies for enhancing human well-being through the conservation of nature itself, as development is unsustainable if it does not value and conserve the biophysical resilience of natural ecosystems.⁸

While ecosystem services markets principally focus on single types of system services, ecosystem-based management approaches place value on the entire ecosystem, including human well-being, rather than managing one issue or resource in isolation. Ecosystem-based management provides planning and economic models of ecosystems or key ecosystem services, generates scenarios that illustrate the consequences of different management decisions on natural resources and the economy, and facilitates stakeholder involvement in planning processes.

In order for markets based on natural resources to function properly, with appropriate incentives and disincentives, an adequate evaluation of ecosystem services must be conducted.

To date, ecosystem-based management typically has been considered as an afterthought, after major development decisions have already been made. The strategy needs to move further up in planning timelines in order to have maximum effect.⁹ Ecosystem-based management principles have been well analyzed and critiqued, but actual adoption of the practices has been minimal; the current challenge is to aid business and policy leaders in operationalizing these tools.

Incorporating Nature into Private Strategy

Increased awareness of benefits afforded by natural systems is not unique to the public sector. The private sector has an equally notable opportunity to integrate nature's value into its strategy-making, via its approach to land management, influencing consumer behavior, Payment for Ecosystem Services (PES) schemes for easement approaches and ecosystem services markets.

Ecosystem services market mechanisms are also necessary tools for incentivizing sustainable development and investment in natural infrastructure, but they are not sufficient in themselves. In order for markets based on natural resources to function properly, with appropriate incentives and disincentives, an adequate evaluation of ecosystem services must be conducted.¹⁰ A systematic process of mapping out ecosystem services is a first step in taking inventory of what is valuable and what requires protection.

Understanding the capacity of natural ecosystems is key to the process of determining appropriate uses, i.e. agriculture, mining, water, etc., and licensing its use in a sustainable way. Establishing monetary values for various users of services in a given ecosystem, arrived at through transparent and inclusive stakeholder involvement, gives participants the opportunity to reach or exceed benchmarks, creating conditions for a market — such as for carbon credits or wetland mitigation credits. This, in turn, allows actors to “do well by doing good.” Importantly, such systems require baseline data from regular monitoring of ecosystems conditions, to inform hard policies — such as policies around water quality and carbon — that can drive markets.

An example of a tool for businesses to evaluate the risks and opportunities arising from their dependence and impact on ecosystems is the Corporate Ecosystem Services review, produced in partnership by the World Business Council for Sustainable Development and the World Resources Institute.¹¹

This guide presents companies with a means of directly gauging the harm or good they are creating for both the ecosystem upon which they depend as well as their profit margins. As a result, these and similar tools develop a business instinct for proper and sustainable maintenance of natural infrastructure.

National economic accounting standards do not reflect the value and importance of our natural infrastructure.

Ecosystem services are likely to be an increasingly prominent consideration in emerging corporate sustainability assessments and standards. **Dow Chemical** and **The Nature Conservancy** (TNC) have entered a new partnership to identify Dow’s impact and reliance on nature. Dow will contribute \$10 million in five years to further integration of nature’s services into business decisions. While this investment represents only a small percentage of Dow’s annual profits, the company has a vested interest in accounting for nature’s services given its reliance on clean water availability in its materials and chemicals production.

Incorporating Nature into Community Partnerships

An illustrative example of the potential of ecosystem-based management that engages community stakeholders in the conservation process is the approach used by **Rare Conservation**, a unique organization that trains local conservation leaders all over the world to change the way their communities relate to nature. Using their signature tool — a ‘Pride campaign’ — Rare teams inspire communities to take pride in the natural resources that make their communities unique, while also sharing methods for avoiding environmentally destructive practices.

In their marine work, Rare teams have successfully implemented community-based Marine Protected Areas, combining zone-based regulations (e.g., “No Take Zones”) with species-specific and ecosystem-based schemes (such as “Territorial Use Rights for Fisheries”). In Loreto Bay National Park in 2009, Rare partnered with Mexico’s national park service to conduct a two-year Pride campaign engaging local fisherman in establishing a sustainable fishing environment and making conservation a way of life. When the national park created new guidelines to increase the size of no-take zones within the park, most of the affected fisherman were unfamiliar with no-take zones or did not respect their boundaries.

Through programs and workshops focused on the benefits of marine protection for fisherman, community awareness was developed that allowed for the successful establishment of the no-take zones, and the necessary respect, monitoring and enforcement required for successful conservation.¹² With one billion people worldwide dependent upon seafood as their primary source of protein,¹³

engaging both local governments and coastal communities in protecting not only their livelihoods but also an important food source requires a new paradigm – one that has been the key to Rare’s success in true behavior change in ecosystems around the world.

Ecosystem Service Indicators

The need for appropriate valuation tools extends to national economic accounting practices as well. Businesses and national economies are dependent upon the services that natural infrastructure provides, but this reality is not captured in economic metrics. National economic accounting standards do not reflect the value and importance of our natural infrastructure.

A recent report issued by TEEB and hosted by the UN Environment Programme (UNEP) concluded that policymakers who factor the planet's multi-trillion dollar ecosystem services into their national and international investment strategies are likely to see far higher rates of return and stronger economic growth in the 21st century.¹⁴ Some countries have already made the link to a limited extent and are witnessing benefits in terms of jobs and economic returns that outperform those pursuing business-as-usual models.

Despite this, Congress has for many years now in the United States prohibited any expenditure by the Bureau of Economic Analysis to develop national environmental economic indicators (“Green GDP”), which would factor into national accounting the depletion of natural resources and damage to the environment.¹⁵ There has thus been an intentional blind eye turned to exploration and use of tools that appropriately capture the value provided by natural infrastructure.

Despite apparent political inattention, The **Natural Capital Project** – a partnership between TNC, Stanford University, World Wildlife Fund and the University of Minnesota – is attempting to better identify the suite of benefits provided by nature and different types of intact ecosystems and to provide this information in a policy-relevant format. Using a multi-disciplinary team of ecologists, economists, engineers, GIS specialists and hydrologists, the Natural Capital Project is developing open-source software to assist policy-makers, NGOs and corporations in better understanding outcomes associated with various land- and resource-use decisions.

III. ENGAGING ALL KEY PARTICIPANTS: THE PRINCIPLE OF LOCAL OWNERSHIP

Promoting investment in natural infrastructure and sustainable development requires engagement from a range of participants, including local communities, the business and finance communities, conservation and development/humanitarian NGOs, and local and national governments. In order to gain greater leverage through the powers of synergy, the key participants will need to form new coalitions in support of development plans that support natural infrastructure. These coalitions can be reinforced through a range of arguments, including:

- Connection to existing national government priorities, such as food security, poverty reduction, water quality and supply, and adaptation to climate change;
- Cost-benefit analysis suggesting stronger investments include nature in the accounting and natural infrastructure in options;
- Market-based arguments that appeal to those actors who profit motivated; and

- Rule-of-law arguments that frame the problem in terms of the rights and responsibilities of states and their citizens.

Powerful operational synergies are being gained by the conservation, business and development communities where new strategic partnerships have been formed, through the deliberate formation of new strategic partnerships with diverse parties that until now have been mostly unaffiliated, and even occasionally oppositional. Forming such alliances calls for a change in posture based on the promise that working together with various partners leads to better (more sustainable) outcomes than could be achieved unilaterally.

In their zeal or desperation to save what remains of nature... conservationists in the 20th century frequently failed to secure the support of local and communities.

It makes sense that those who stand to be most impacted by changes to or protection of natural infrastructure should have a say in the matter. In their zeal or desperation to save what remains of nature, however, conservationists in the 20th century frequently failed to secure the support of local and communities. To be fair, ignoring or misunderstanding the needs of local communities is not limited to the conservation community.

In part, this stems from endemic underestimating of the value of nature to local communities by outsiders along with a general impatience with the process required to connect with local peoples, many of whom are intensely distrustful of strangers with ready-made solutions. The unique relationship many communities have with nature is not one that is easily understood or appreciated, especially by outsiders. Crucially, the value local peoples place on aspects of nature may be difficult to quantify in terms that can easily be incorporated into ecosystem valuation models. Medicinal use, traditional values, and the social safety net that forests, rivers, grasslands, and oceans provide are too numerous to comprehensively list and are systematically undervalued mostly because our current analysis tends to focus on the most pervasive uses and the uses with the biggest short-term returns (*e.g.*, logging, fishing).

Resources like water can have vastly different values depending upon their use and geography; a bucket of water in a household in rural West Africa has a different value than the same bucket of water used to fill a family swimming pool in California. For the Wehea, a Dayak people in Indonesia, their identity is intricately tied to and defined by the traditional forest they occupy. Lose the forest, log it, or convert it into palm plantations, and the Wehea fear that they will lose their identity. For them, the Wehea forest is not a resource for the creation of wealth but one that defines their very identity. In the 21st century, it is critical that people who depend on the natural resources are engaged in managing them. For several reasons, this may require some sort of ownership rights:

- Local communities, as a result of their proximity and long history in a place, are uniquely positioned to be long-term stewards of nature. While conservation (and development) activities are relatively palatable when funding from abroad is available, once this funding dries up, it is the local populace that is left. Without local support and stewardship, long-term conservation at scale is unsustainable.
- In countries like Brazil, Canada and India, courts and governments have confirmed the rights of indigenous communities to exercise ownership over vast tracts of traditional lands — often the most biologically diverse and untrammelled areas in the country. If conservation is to be successful in these parts of the world, it must grapple with the questions of legal ownership, tenure and access.

- Given principles of equity and justice, we cannot assume to do what is best for the planet and its people by ignoring the wants and aspirations of those who often have the least but must bear the greatest cost of living in proximity to the wild.

If the proper incentives are aligned with sustainable development policies, local populations can take ownership of their natural environments and willingly assume the role of good stewards. Local populations should be compensated for use of the natural capital in their communities. Ideally, this compensation would take the form of some transference of wealth and economic benefits from those who use the services of nature to those who protect or maintain the services. For example, city dwellers using water from a local watershed could pay through their municipal fees that are transferred to communities that help protect the watershed from destruction; this strategy is being employed in dozens of watersheds in the Andes region of Latin America. Similarly, in Northern Kenya, nomadic communities benefit from conservation of the rangeland and wildlife resources through eco-tourism schemes and efforts to improve security in a previously lawless region.

Of course, all methodologies should be tailored to fit the local cultures and the resources or values of nature that are most used. Global one-size-fits-all solutions tend to backfire. If structured poorly, local ownership of public goods has the potential to lead to under-management of those public resources. Granting of ownership rights can be remarkably complicated as positive results of such actions do not flow automatically.

Above all, whatever the solution may be, we have learned through challenges to implementation of externally-introduced systems such as REDD¹⁶ that new systems will only last if local peoples accept and embrace them. Without their support, no matter how novel the solution and how good the intent, over time it will not be sustainable.

Conservation can only work to the extent to which those closest to the resources – and thus impacted by regulation – are involved. Natural infrastructure development can play this role to increase local engagement and thereby the long-term sustainability of nature conservation systems.

Conservation can only work to the extent which those closest to the resources - and thus impacted by regulation - are involved.

IV. Addressing Development through Natural Infrastructure Investment

Conservation efforts would be more effective if they included development strategies and, conversely, development efforts would be more equitable and sustainable if they incorporated ecosystem conservation principles. Human prosperity and development are inextricably linked to functioning natural ecosystems. If the conservation and economic development communities, and their respective funders (*i.e.*, foundations, donors, development banks, etc.) could embrace and demonstrate shared objectives, strategies, and measures of success, it would create a greater likelihood of success with regard to both development and conservation goals and thus increase support from local peoples, business sectors, philanthropic foundations, and government. Yet, it is clear that the institutional frameworks for driving (and funding) highly integrated conservation and development solutions are not yet in place. Previous attempts at marrying the efforts of the conservation and development communities have resulted in piecemeal efforts; this atomistic approach has demonstrated that they cannot scale up fast enough to match the pace of global change.

Non-Governing Organizations and Private Funders

Although the NGO economic development community includes hundreds of organizations working around the world and billions of dollars in funding (increasingly from private foundations), many leaders in the field are not familiar with the concepts of sustainable development such as ecosystem services or ecosystem-based management. Nevertheless, development professionals are likely to find themselves trying to figure out how to properly price natural resources in the communities where they work, to ensure sustainable supply. Moreover, pressing development priorities – such as access to clean water, food security, adaptation to changing climate and rural poverty reduction – all have an ecosystem services element at their root (e.g., ecosystem degradation) and in their solutions (e.g., ecosystem restoration).

...the institutional frameworks for driving (and funding) highly integrated conservation and development solutions are not yet in place.

The conservation and non-profit economic development communities should work together to identify common analytical frameworks – where the **Millennium Ecosystem Assessment** arguably makes its greatest contribution – by providing a conceptual framework that links ecosystem health and human well-being through an ecosystem services framing. By the same token, organizations within both communities must identify their own internal pathologies that get in the way of their mutual success.

In order for any new, unorthodox collaboration — whatever form it takes — to be successful in the realm of conservation and economic development, partners must relinquish some of their traditional notions of ownership or sovereignty in service to the common mission.¹⁷ The conservation community needs to recognize that the non-profit economic development community focuses its efforts mainly on specific geographic areas and service sectors, in particular food security. Conservationists must also recognize the importance of human needs when it comes to issues of environmental preservation. The social and economic development community needs to acknowledge that many of its past efforts have failed because they did not include plans for environmental sustainability and protection of natural infrastructure. Development is neither equitable nor sustainable if it does not preserve ecosystems for future generations.

Business and Finance Communities

Outreach to the business and finance communities in support of properly valuing ecosystems in the context of economic development must include making a persuasive argument in economic and business terms.

Businesses are focused on maximizing shareholder value and the arguments therefore cannot be that businesses should be “socially responsible” but rather that there are real business benefits from valuing ecosystem services. Such arguments can take numerous forms, from the PR value of embracing sustainable practices, to basic dollars-and-cents comparisons between unsustainable versus sustainable strategies, to protection of businesses’ supply chain inputs. In the current economic environment, with growing budget deficits and high unemployment rates, business leaders and politicians are particularly anxious about perceived costs of any proposals and are more focused on short-term gains than on long-term value. This creates a challenging context for advancing sustainable development and protection of ecosystems.

Investment in Natural Infrastructure with a Vision for Economic Development

- **The Corporate Ecosystem Services Review – Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change:** “This publication provides corporate managers with a proactive approach to making the connection between ecosystem change and their business goals. It introduces the Corporate Ecosystem Services Review—a structured methodology to help businesses develop strategies for managing risks and opportunities arising from their dependence and impact on ecosystems. It is a tool for corporate strategy development and can augment existing environmental management systems.” www.wri.org
- **Forest Trends: Ecosystem Marketplace:** “Markets depend on transparent and reliable information to function. What is true for investors on Wall Street is equally true for environmental market players trading in carbon, water quality, and biodiversity...The Ecosystem Marketplace is a leading source of news, data and analytics on markets and payments for ecosystem services (such as water quality, carbon sequestration and biodiversity) . . . by providing unbiased information on policy, finance, regulation, science, business and other market-relevant factors, markets for ecosystem services will one day become a fundamental part of our economic system, helping give value to environmental services that, for too long, have been taken for granted.” www.forest-trends.org
- **The Walton Family Foundation’s** environment work is rooted in a belief in *conservationomics*, the idea that “the conservation solutions that make economic sense are the ones that last . . . A recent study by Greater New Orleans, in partnership with the foundation and Mather Economics, confirms that investments in Gulf restoration, for example, will directly impact the prosperity of the people and business that call the Gulf Coast home.” www.waltonfamilyfoundation.org/environment
- **Dow Chemical Company and The Nature Conservancy:** “Dow and The Nature Conservancy recently embarked on an effort to build a roadmap for how companies assess, incorporate and invest in nature and the benefits it provides, like fresh water, clean air and flood protection. The partners believe that, while the economic value of nature’s benefits often are appreciated only upon their loss, leading organizations have now realized that nature is an essential and fragile asset.” www.nature.org
- **Rare Conservation:** “Rare partners with local conservationists to implement campaigns that inspire people to take pride in the species and habitats that make their communities unique. Known as Pride Campaigns, these initiatives use Rare’s signature methodology of applying commercial marketing tactics to promote the adoption of sustainable behaviors, while providing and teaching alternatives to environmentally destructive practices. Rare partnered with Mexico’s National Commission of Natural Protected Areas (CONANP) to protect Loreto Bay National Park and work the local fishing communities which had seen their fish stocks depleted after years of overfishing.” www.rareconservation.org
- **African Wildlife Foundation:** A program that puts economic value on achieving critical conservation goals is AWF's impact investing work through African Wildlife Capital (AWC). AWC considers investments in the range of \$.25-1.5M throughout sub-Saharan Africa to boost the capacity of businesses willing to link their enterprise to tangible conservation results. The objective is for "AWF and AWC to not only help Africans improve their livelihoods, but also to provide incentives to business owners and their employees willing to consider conservation as a key ingredient of their business model.” www.awf.org

We can already notice a shift in the way businesses perceive this issue: one out of every four global CEOs now sees biodiversity loss as a strategic issue for business growth.¹⁸ Additionally, ecosystem services have recently been included in the **International Finance Corporation** (IFC) performance studies utilized by all equatorial banks.¹⁹ Yet advocates for investing in resilient natural infrastructure will not be able to convince all businesses, and therefore it is critical to reach out to iconic companies and companies whose value chains or operations are highly dependent on stable ecosystems (*e.g.*, agriculture, hydropower, insurance) and that have recognized the need to incorporate a broader concept of *value*. These actors can provide a model for others to follow. Businesses reliant on natural infrastructure for creating wealth are in a unique position to demonstrate the value of assessing supply chains, operations, sourcing and other aspects of the business to assess the risks and opportunities associated with ecosystem change.

Some businesses have already put their stakes down in the conservation agenda. For example, the **Shangri-La Mactan Resort and Spa** in the Philippines established its own marine reserve, transforming a rock garden into a vibrant coral reef ecosystem. By setting aside 5 hectares for conservation and engaging staff and guests in activities like coral and giant clam propagation, reef checking, and beach and dive clean-ups, the resort has invested in creating a unique experience for their guests while playing a part in not only maintaining but building the biodiversity of the space around them. The resort intends to extend the reserve to ~27,000 square meters of additional artificial reef, focusing on additional species like seahorses, butterfly fish and various types of parrot fish.²⁰

Private investors and financial institutions are also important potential strategic partners in the proposed new conservation/development framework, so their particular limits and requirements should be clearly understood. Put simply, financiers traffic in *deals* and are focused on the *risk-reward* balance (the higher the risk, the greater the potential return should be). Crafting investment frameworks, asset classifications and rating systems that allow investors to earn returns on the de-risking and savings value of ecosystem services could yield an influx of private capital into natural infrastructure growth and maintenance.

In many cases, there is a solid return on investments in natural infrastructure (which can also be couched as investments in disaster risk management or other de-risking concepts, depending on the investor). Wetland and farmland measures in the Chesapeake Bay area, for example, can accomplish more than higher priced measures like refrigeration units at end of pipes or denitrification. In Venezuela, investment in a national system of protected areas is preventing sedimentation that otherwise could reduce farm earnings by around \$3.5 million a year. Cultivating about 50,000 acres of mangroves in Vietnam costs just over \$1 million but saves over \$7 million on annual dike maintenance, while one recent study concluded that re-establishing oyster reefs as a buffer against coastal storm surges and erosion in the U.S. would be cheaper than pouring concrete bulkheads (there also are not enough basic materials to make a sufficient amount of concrete to protect vulnerable areas).²¹ There are many, many more examples like these.

Businesses...are in a unique position to demonstrate the value of assessing supply chains, operations, sourcing and other aspects of the business to assess the risks and opportunities associated with ecosystem change.

It is important to recognize, of course, that economic and business arguments will not necessarily be relevant for all conservation goals. For instance, protecting certain species that are dangerous to humans and that bring insignificant tourism may have high conservation value but be challenging to sell

as an effort that has high economic value or return on investment. In those cases, other actors would need to continue more orthodox methods of conservation with the aid of a major enforcer. The historic role of conservation and preservation has economic, social and *existence* value – particularly when it is calculated or measured as part of the natural infrastructure supporting and sustaining the biological diversity of life on earth.

Government

A sustainable ecosystem-based market cannot exist without a strong regulatory framework. Traditionally, government's role in conservation has centered on protecting public goods that are difficult to value, such as biodiversity (for example, via the Endangered Species Act) and unique public lands (for example, the National Parks system). Particularly in cases where entrenched economic interests pursuing unsustainable practices cannot be swayed by reasoning or other appeals, a *realpolitik* approach can establish the true value of ecosystems and thereby regulate sustainable use of natural infrastructure. While the appropriate extent to which government should be involved in the process will be determined as more projects are developed, it is clear that at least some regulation is necessary.

Notably, governments can play a principle role in establishing robust and long-term monitoring systems of ecosystem conditions, to be incorporated into national economic accounts. These monitoring systems can provide means for greater public engagement – most importantly at a local level – around decisions that affect the stability of ecosystem services. Building on this role, government can also integrate nature's values into policy through legislation impacting the ways in which land and natural resources are used. By considering ecosystem services in making decisions around the management of public lands either used for production or leased for private use, and in assessing other federal policy options (such as the implementation of biofuel energy or agricultural policies), government can augment the sustainability of policy by investing in long-term development of nature's services.

Protecting biodiversity even where human well-being is not directly impacted is a valuable pursuit if society desires it, and institutions such as the national parks are essential for securing the gains that have already been made towards maintaining ecosystems...

In addition to implementing policy with nature's services integrated into long-term strategy, government can also play a strong role in influencing the decisions made by both state and local policymakers, as well as private business and landowners. Planning processes and requirements – for example, tools like the Coastal Zone Management Act, Regional Fisheries Management Councils, and State Wildlife Action Plans – establish a framework through which governments can not only encourage but enforce investment in natural services.

Within the private sector, policymakers have the opportunity to influence business via executive orders on sustainable supply chains, incentive programs in agricultural policies and tax easements, and specific regulations on environmental impacts.

Policymakers have several other possible roles to play in bringing about greater investment in natural infrastructure in order to unite conservation and development goals, especially in the promotion of public-private partnerships. Yet, in cases in which few economic, financial or developmental arguments for conservation are present, government can still act in the role it knows best. Protecting biodiversity even where human well-being is not directly impacted is a valuable pursuit if society desires it, and institutions such as the national parks are essential for securing the gains that have already been made towards maintaining ecosystems.

V. EXIGENT OPPORTUNITIES FOR POLICY, FUNDING AND ADVOCACY PROGRESS

The constituencies above may be critical allies in efforts to achieve policies that advance investment in natural infrastructure. Governments have a key role to play in such investment – funding the collection of knowledge and data on ecosystem services, targeting public conservation budgets to better achieve ecosystem service outcomes, ensuring that policies concerning manmade infrastructure development require minimized impacts and mitigation for loss of natural infrastructure, etc. Below are a few of the important opportunities for policy progress at the domestic and international levels.

Climate Change

In recent years, the climate change debate has dominated discussion in the environmental community, which has been particularly focused on reducing greenhouse gas emissions. Progress has been fairly limited. Analyses of the climate dialectic reveal that because the public does not see how climate touches their lives (as opposed to the immediacy of weather), they have no cause to reduce emissions. In contrast, degradation of land and water does touch people’s lives. The climate issue cannot be ignored – it is too large and the consequences of a 3 degree (or higher) temperature rise are too dire. The climate dialogue and the conservation dialogue cannot be in competition with one another.

The temperature “regulating” function of the atmosphere is an ecosystem service of nature. Climate change has the potential to be incredibly destructive to natural infrastructure in a range of ways. There are opportunities to use the climate debate to focus on ecosystem services that more clearly impact people’s lives. And the global response to climate change has the best chance of being monetized and priced as an ecosystem service that is currently out of balance with human activity.

Climate change is attracting a huge amount of resources and attention to the need to preserve carbon sinks, which also helps stem global biodiversity loss. The conservation community is largely winning the fight to get natural resource conservation taken seriously as a climate strategy for reducing emissions and for climate adaptation. There are thus policy solutions that both promote resilient ecosystem services and address climate change, such as the *Reducing Emissions from Deforestation and Forest Degradation* (REDD) initiative (see also REDD Plus Plus, which appears to still be undergoing some definition by the United Nations but in effect would seem to be directed at assigning credits to the mitigation of carbon in soil).²² Policies like these, which operate at the nexus of climate change and ecosystem services, should be a key focus going forward.

Although local communities around the world are responding to the challenge of climate change by beginning to envision green and/or low-carbon economies, a concerted effort must be made to connect individual communities in the political, business and policy breakthroughs that all communities can learn and benefit from. Any policy or initiative that aims to reduce greenhouse gas emissions or address the consequences of climate change will bring about changes not only in our environment, but also in our society and our economy. The urgent need to transition to a low carbon economy presents critical choices, and we therefore should also approach climate policy as economic policy that can advance principles of fairness, opportunity and equal access.

Some models of ecosystem-based development must achieve a scale and significance that will seize the imagination, spirit and collaboration of all sectors.

Food Security

The onset of two global food price crises in less than three years has triggered growing recognition that food insecurity has geostrategic, humanitarian and environmental consequences all contributing to political turmoil in regions exposed to the impact of soaring food prices. The developing world, with densely-packed cities heavily reliant on imported food and a lack of reliable systems to move food from producers to consumers, is particularly vulnerable. Furthermore, with a global population that will reach nine billion by mid-century, the question of *how to sustainably and nutritiously feed a growing population* looms large.

With agriculture among the largest sectors impacting the global carbon and nitrogen cycles, as well as water and energy usage, agricultural policies and markets represent a key avenue for promoting sustainable economic development practices that properly value natural infrastructure and ecosystem services. For example, the amount of carbon stored in soil may be linked to the capacity of that ecosystem to filter air and water, to prevent erosion, and to store water. Consequently, changes in soil carbon may add to the effects of other ecological factors. Ensuring long-term food security by sustaining ecosystem services in a changing climate is one of the paramount challenges facing humanity in the 21st century.

Coastal and Marine Systems

The oceans provide valuable ecosystem services and natural resources that are critical to the biological, chemical, and physical balance of the world. Marine systems and, in particular, near-coastal areas harbor ecosystems uniquely adapted to their environment upon which some communities depend for their livelihoods and food, as well as protection from natural disasters. Recognizing and assessing the value of ecosystem services provided by oceans and coastal areas can help inform, balance and sustain the natural infrastructure of these systems for conservation and human well-being.

Ecosystem-based management is an integrated approach to management that considers the entire ecosystem and considers the cumulative impacts of different sectors. A full suite of ocean ecosystem services, including the regulation of climate, the provision of food, habitat, and genetic resources to support human well-being on a continuing basis can be maintained by valuing and allocating human activities in time and space with the goal of sustaining those services. The increase in the science and implementation of ecosystem services valuation and ecosystems based management around the world has occurred at the same time as a similar increase in the science and application of marine protected areas (MPAs). In the arena of marine management, there are a wide variety of spatial management tools used to accomplish a range of goals including habitat protection, conflict resolution, planning, and fisheries management. Overfishing is often a factor addressed directly or indirectly by such spatial tools.

Technology

Given the pace of economic expansion and the spread of modern technology globally, it is vital that the conservation and development communities make a sober assessment of various technology strategies and investments that could be pursued to provide developing societies with the standards of living they increasingly demand, while minimizing harmful impacts on ecosystem services. Possibly for the first time in the history of economic development, we have the scientific knowledge and technological capability to make investments in natural infrastructure that will pay large dividends in terms of human well-being

in the future. Advances in scientific understanding and remote sensing technologies now make it possible to identify priority ecosystems and to closely monitor the effects of new natural resource management techniques. While new technologies have their place, some low-tech approaches to managing ecosystem resilience, particularly in the field of agriculture, are more resilient and climate change smart than some high-tech alternatives.

Using an ecosystem-based management approach to assess all the various services provided by a set of natural resources, biodiversity can be maintained in intensively and intentionally well-managed landscapes. This is particularly so in combination with management, technology, and investment strategies designed to optimize natural services and resilience. Existing environmentally “smart” technologies can be built into the front end of development projects that potentially impact natural infrastructure. Anticipating negative impacts and designing for their mitigation is always preferable to reacting to them after the fact.

VI. Natural Infrastructures: Scale and Imagination

The Golden Gate Bridge could probably never have been built in the current political and economic environment. In some places, large landscape development and infrastructure projects are languishing on the drawing board, awaiting the right mix of creative financing, political support and timing to move forward. While large high-profile projects sometimes suffer from the lack of public support depending on when the public is expected to foot the bill, they also lack sustainable planning and architecture. They also lack imagination. Most new large scale infrastructure projects are merely an extension of the past and incorporate only the legal and most minimal assessment of environmental and community impacts. The scope of many historical public works and projects, however, convey the magnitude that must be considered to model some of the metropolitan and regional changes that are necessary to correct decades of urban sprawl and anticipate the ecological balance needed for urban and built landscapes of the future.

Examples of development projects with positive conservation outcomes as well as examples of conservation efforts with clear and direct benefits to humans should be synthesized into a collection of best policies and practices, alongside a robust cost-benefit analysis, which is currently lacking but an important tool for understanding. This will require more projects in the field that demonstrate real success and make the business case (including job creation) for holistic approaches to conserving natural resources and biodiversity while providing clean air, clean water and decent living conditions to a growing global population.

A set of criteria by which ecosystem-based management projects could be compared and rated include their potential to:

- Generate or give effect to the compelling new narrative of “natural infrastructure”
- Make ecosystem-based management principles mainstream
- Take advantage of clear windows of (policy or development) opportunity
- Identify outcomes to ensure underlying goals are accomplished
- Replicate success and gain scale
- Create broad, local ownership with organizations
- Forge strong synergies between communities
- Make a clear business case for actions incorporating the economic value of ecosystems

In order for ecosystem based development projects to be successful on a global scale, they need to be both replicable and scalable.

More visible, demonstrable models of sustainable environments are needed. Some of them must achieve a scale and significance that will seize the imagination, spirit and collaboration of all sectors. The emerging models in the transition from a fossil fuels based economy to a more sustainable and green economy employ many of the necessary components strived for by communities everywhere including sustainable and equitable growth, opportunity, and reduced poverty. But a less toxic, low-carbon economic infrastructure can only be realized when “smart growth” ideas and “shovel-ready” projects move beyond doing “less bad” to fully accounting for the provisioning, regulating and supporting services that ecosystems and natural infrastructures provide and replenish – such as watersheds, natural habitats and the biodiversity necessary to maintain a healthy environment.

In order for sustainable technologies to be successful on a global scale, they need to be both replicable and scalable. An overriding metric in the selection process should be a project’s potential to scale-up in terms of ecosystem benefits connected to human needs. It is not enough that a transportation, energy, building or water infrastructure project is required for “economic development.”

Certain projects might be worth pursuing if they serve to test out new, non-traditional alliances that could lead to powerful new strategic partnerships going forward. Likewise, if a given joint venture promises to tap new sources of private capital, this could be justification enough to pursue it. Replicability should take into account the need to tailor projects to the communities and natural landscapes in which they are to be implemented in addition to the needs of investors for common structures.

In addition to existing projects and initiatives, another more deliberate level of coordinated investments should be sought to leverage a scale of demonstration likely to gain a significant level of regional or national recognition as a model for future sustainable development and innovation. Projects in this category would be organized to emphasize, develop and demonstrate the critical link between community stakeholder engagement, state and local resources, natural infrastructure services, public policy and the need to leverage public and private financial investment sources:

Devastated Ecosystems and Economies: Communities devastated by environmental disasters such as Hurricane Katrina in the Gulf Coast, Mississippi Delta flooding, as well as other severely economically depressed urban and rural communities, are confronted with a combination of social, environmental and economic challenges that hinge on the development of clean energy, smart growth and transportation systems planning that better serve more people while fostering economic vitality and environmental sustainability for both businesses and communities. Areas degraded by agriculture and other livelihood-based activities are as much in need of restoration and long-term planning as areas affected by natural disaster.

Restoration: In China, efforts by the government to resuscitate dry land degraded by unsustainable agricultural practices, deforestation, and mismanagement of water resources (in partnership with the Global Environment Facility, The World Bank, and Asia Development Bank) have been successfully using ecosystem management tools to undo land degradation and alleviate poverty caused by local communities losing their land-based livelihoods. In Sichuan and Gansu provinces, the United Nations

Development Program (UNDP) has partnered with local governments to restore the Ruoergai peat lands and, by engaging the local community, for the first time to successfully establish a framework for issuing sustainability-focused local regulations monitoring wetland water levels and reducing the impacts of livestock and mining on this important ecosystem. These regions all must continue to develop a strong grasp of the significant role that the natural infrastructure and climate change play in sustaining healthy communities and environments.

Cities as Metabolism: The concept of “urban metabolism” has been used to describe the resource consumption and waste generation of the cities for some time by drawing an analogy with the metabolic processes of organisms. Some of the most ambitious efforts to recycle and conserve natural resources are being put forward by cities. San Francisco, San Jose and Los Angeles, for instance, are all working on plans to reduce to zero the waste going into landfills. The challenge is to create closed-loop municipal systems that can reduce materials flows that end up as waste at the city level by driving changes all the way upstream to the source, but also to metabolize waste as a source of energy and recycled materials for construction and other uses.

Green Economies: The United Nations Environment Program’s (UNEP) Green Economy Initiative is a project designed to communicate that the greening of economies is not a burden on growth but rather a new engine for growth, employment, and the reduction of persistent global poverty. For the purposes of the Green Economy Initiative, UNEP has developed a working definition of a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.

VII. CONCLUSION

In an age of unprecedented human advances, the concept of “conservation” has failed to keep pace—especially in light of the economic value we are just now beginning to understand that nature provides. A new definition of “conservation” might seem obvious, but the struggles and failures of the past decades suggest otherwise. Again, for too many people, particularly in the developing world, conservation exists as a challenge to their livelihoods and aspirations for economic growth. Instead of being a source of inspiration, conservation is instead a source of inexorable friction between conservationists and the human development community, which otherwise could be powerful allies.

A transformation of conservation methods needs to occur. Only when the value of “ecosystem services” is incorporated into business, community and government decisions can the benefits from nature—like flood protection, crop pollination and carbon storage—become part of traditional economic calculations. Presently, there is no economic value placed the ecosystem services we care about. Since traditional economic calculations often ignore nature’s value, the results frequently lead to the destruction of the very ecosystems upon which economic development is based. While nature's services do not necessarily need to have a monetary value assigned to them, the conservation community can strive to make explicit the dependency of business and communities on functioning ecosystems, the risks that businesses and communities face when they are lost and the benefits garnered in restoring them.

VII. RECOMMENDATIONS

1. Private and public capital investments should be made in “natural infrastructure” systems, particularly those serving human communities.

Nature provides all forms of services with value to human communities. These include supporting services (e.g., air, water and soil), regulating services (e.g., climate temperature, water cycle recharge and carbon sequestration), and provisioning services (e.g., minerals, fish stocks and agriculture).

For too long, investment has primarily been channeled into the built landscape, ignoring real and profitable opportunities in natural infrastructure. These investments, from forests to watersheds, are present around the globe and are relevant and provide value to business, government, and society as a whole. Furthermore, returns on investment in natural infrastructure do not depreciate, but instead provide sustained or increased returns well into the long run.

At the same time, many opportunities for investing, restoring, and maintaining the natural infrastructure that provides essential services cannot be acted upon due to socio-economic and geographic constraints. In many cases, the geographies with the greatest potential and the greatest need for investment are those whose human populations are least able to fund such endeavors. There, outside partners should be cognizant to work and empower local peoples to develop and implement strategies necessary to repair and optimize services provided by nature.

2. Assessment of financial investments in natural infrastructure should incorporate ascribed value of natural services provided by existing ecosystems upon which the investments depend.

Mainstreaming the ecosystems services approach is a critical step towards incorporating natural infrastructure into the discussion of investment in general. In order to maximize potential gains, governments must analyze the dependencies of proposed activities on the natural landscape and their varying ability to function under increased stress. To date, this has not been done, resulting in costly – yet avoidable - destruction of ecosystems.

Planners must change their preconceived notions of the natural landscape, recognizing the large degree of development already present in the form of ecosystem services. To aid with this shift, environmental NGOs should share their knowledge of conservation efforts and local peoples should be invited to share their experience within their own communities. Broad collaboration is not current orthodoxy in public policy making, but neither has been success in uniting efforts toward environmental maintenance and economic betterment – this must change.

Tools such as the Corporate Ecosystem Services review, produced by the World Business Council for Sustainable Development and the World Resources Institute, and The Economics of Ecosystems and Biodiversity (TEEB) report, can be used to rationalize and justify private investment in natural infrastructure. Policymakers should work to implement measures that calculate “green GDP” and quantify the value of natural infrastructure. With these mechanisms

in place, valuation would become standardized and would incentivize its consideration at the outset of decision-making.

Common standards – such as those created by the International Finance Corporation (IFC) that include ecosystem services – must be established through which to measure the outcomes of the actions taken by investors. These standards would further incentivize investment in natural infrastructure by encouraging funds to be targeted towards the most beneficial services and by urging greater competition among leading exponents in the private sector. Those companies that exceed baseline standards should expect positive publicity and greater consumer appeal in addition to greater gains from ecosystem services.

As more projects are carried through to fruition, it will become possible to standardize the general process and replicate it across geographies with critical adjustments for local necessities and concerns. Projects will also have to expand, growing beyond initially small settings to larger areas that encompass and incorporate ecosystems in an increasingly holistic way. As more successful projects are implemented it will become easier for new actors to enter into this sector and achieve increasingly effective results.

3. The use of ecosystem services assessment should be implemented in natural resource planning and development at multiple scales (including infrastructure development and resource extraction).

The environmental construct of “pristine” nature as something to be externalized or removed from interaction with human communities is outmoded and should be understood as only one approach to conservation and separated from modern conservation efforts.

The footprints of human civilization have been left in every ecosystem on the planet, and a growing population will intensify the contact between people and nature. Efforts to “fence off” geographies purely for aesthetic or moral reasons will encounter greater opposition in the face of increased demand for resources such as arable land, water, or minerals. In order to be successful in a changing world, conservation must not be combative, but rather collaborative and inclusive.

Failure to design and execute projects in tandem with government, civil society and the private sector that incorporate ecosystem services assessment for natural resource planning will preclude success in globalizing conservation. That being said, the progress that has been made towards conservation over the past century need not be discarded. Institutions for maintenance of ecosystems, such as national parks, can and should continue to function. Yet such institutions are not broadly replicable because they are not sustainable without significant support from governments and their respective publics.

4. Expand upon the existing group of strategic collaborations between the private sector and government (i.e., “public-private partnerships”) in critical areas for creating investments to manage, conserve and restore natural infrastructure functions for the benefit of humans and nature.

Conservation conducted in opposition to the private sector is not economically practical; instead, governments should be encouraged by NGOs and other conservation groups to seek the assistance of businesses in order to secure necessary funding and incorporate natural services into the process of improving the lives of populations. As these projects are also beneficial to private investors, governments should not feel the need to force participation so long as the gains are quantitatively visible and understood.

Still, governments must create regulations dealing with investment in natural infrastructure and enforce them to ensure that private entities meet their commitments and are compensated fairly for their assistance, and that improper actions or false reporting are punished. The unbiased verification by a third-party will also help to improve popular confidence in the efficacy of investments into natural infrastructure, which will increase the potential gains for businesses.

5. All investments in natural infrastructure must embrace the principle of “local ownership” to ensure consultation with and management by local peoples in order to be successful and sustainable.

Strategies that do not include the voices, support and expertise of local peoples will inevitably be opposed by them and will fail. A paramount weakness of prior and current conservation efforts has been the inability of organizations and experts to develop inclusive programs that clearly benefited both nature and people. To a large extent, that was due to the desire on the part of the former to preserve nature and disembed it from the lives of people.

Investments in natural infrastructure are inherently inclusive, as they focus on the mutually beneficial relationship between people and the ecosystems they inhabit. But these efforts must go further, allowing local peoples themselves to manage these projects and voice their opinions according to their needs and preferences. Local proprietorship, alongside the intrinsic desire of people to act in their best interest, has the potential to aid in the process of instilling a sense of responsibility for successful outcomes.

6. A concentrated effort should be made by philanthropic foundations, human development organizations and conservation groups to integrate the value of natural infrastructure (and/or ecosystem services) into programs and decisions.

Using an ecosystem-based management approach to assess all the various services provided by a set of natural resources, a good deal of biodiversity can be maintained in intensively and intentionally well-managed landscapes, particularly so in combination with management, technology and investment strategies designed to optimize natural services and resilience. Certain projects might be worth pursuing if they serve to test out new, non-traditional alliances that could lead to powerful new strategic partnerships going forward. Likewise, if a given joint venture promises to tap new sources of private capital, this could be justification enough to pursue it.

As in their meetings, participants reaffirmed that in order for any new, unorthodox collaborations – whatever form they take – to be successful in the realm of conservation and economic development, partners must relinquish some of their traditional notions of ownership

or sovereignty in service to the common mission. More than one participant pointed out the necessity to avoid fatigue and overcome cynicism among individuals within organizations that have heard the mantra about potential synergies between partner organizations before, only to see such attempts unwind due to lack of effective leadership or actual results. The question arises then, where and how does a new multidisciplinary field come together between traditional conservation actors, sustainable economic development, and the “real world” requirements of business? The funding community should internalize and communicate a positive human-oriented theory of ecosystems-based management with the public, governments and business; and thereby accelerate investments in natural infrastructures.

7. Financial institutions, rating agencies and the insurance industry should play a more active role in valuing natural infrastructures, ecosystem services and ecosystem management and as part of national prosperity indicators (e.g. a “green GDP”) and financial due diligence in valuing risk-adjusted capital investments in all forms of industry, commerce and economic development.

Investments in natural infrastructure represent a tremendous opportunity for financial institutions. But just as the public sector must often incentivize the creation of physical infrastructure, financial institutions must provide the necessary assurance for other private and public interests to initiate the creation and expansion of the market. Other businesses and government need quantitative estimates for expected returns on investment before committing to specific projects. Tools that can assign value to ecosystem services should be utilized or promoted by financial institutions, rating agencies and the insurance industry.

The other essential ingredient needed to spur investment is confidence. While valuing ecosystems services alone will allow organizations and businesses to assess the bottom line, endorsements and estimates of potential risk by accredited and credible institutions will provide the necessary assurance to encourage entry into the market. An insurance market can be a component of natural infrastructure investment, and ratings agencies can perform an equally crucial role by distinguishing effective and ineffective opportunities.

¹ “World Population Prospects: The 2010 Revision, Press Release.” United Nations, Department of Economic and Social Affairs, Population Division. Web. 3 May 2011. <http://esa.un.org>.

² United Nations Conference on the Human Environment (Stockholm, 5-16 June 1972).

³ MDG 7 is the goal that seeks to ensure environmental sustainability, and reverse the loss of environmental resources, through a series of targets to be met by 2015. “When environmental issues are discussed in the context of the other goals, the causal link between poverty and the environment is not well articulated nor is a response system developed.” Making Progress on Environmental Sustainability (UNDP 2006).

⁴ de Groot, Fisher and Christie. *Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation*. The Economics of Ecosystems and Biodiversity (TEEB, March 2010).

⁵ The concept of Green Economy has gradually emerged and caught the attention of global policy bodies in recent years. In December 2009, the UN called for a conference to mark the 20th anniversary of the 1992 Rio Earth Summit, and later identified “green economy in the context of sustainable development and poverty eradication” as one of its two major themes. Then in February 2012, after an extensive three-year study, the UNEP came up with a 626-page report entitled *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, commonly known as the Green Economy Report.

⁶ Leopold, Aldo. “The Land Essay.” *A Sand County Almanac*. New York: Ballantine Books, December 1986.

⁷ Cox and Searle, “The State of Ecosystem Services.” Prepared by The Bridgespan Group with support from the Gordon and Betty Moore Foundation (2009).

⁸ Despite the profound importance of resilient natural environments for the survival and well being of humans, it is important to note that not all human wants and needs can be provided directly from nature. Humans require various social affirmations and interactions for fulfillment that cannot be gained from “nature.”

⁹ The National Science Foundation, EPA, and other U.S. federal agencies are beginning to fund various ecosystem-based management initiatives that promise to help drive ecosystem-based management principles further up the planning timeline.

¹⁰ It is vital to note, however, that not all aspects of ecosystems can be measured according to market services or accounting values. Moreover, not all ecosystem services — whether measurable or not — should be put into the service of economic development or market production.

¹¹ Meridian Institute; WBCSD; World Resources Institute. “The Corporate Ecosystem Services Review: Guidelines for Identifying Business Risks & Opportunities Arising from Ecosystem Change.” Version 2.0. www.wri.org. Web. February 2012.

¹² “Success Story: Loreto Bay National Park, Mexico.” www.rareconservation.org. Rare. Web. 15 May 2012.

¹³ Food and Agriculture Organization of the United Nations. *FAO Yearbook: Fishery and Aquaculture Statistics 2007*. FAO, 2009.

¹⁴ “The Economics of Ecosystems and Biodiversity: TEEB for National and International Policy Makers.” www.teebweb.org. United Nations Environment Program (UNEP). Web. 2009.

¹⁵ Bill Chameides. “GDP: Not All It’s Cracked Up to Be?” *The Green Grok*. Web. 23 September, 2009, <http://www.nicholas.duke.edu/thegrengrok/gdp>.

¹⁶ Reducing Emissions from Deforestation and Forest Degradation (REDD) initiative.

¹⁷ As a note of caution, more than one participant in the Aspen dialogue pointed out the need to avoid fatigue and overcome cynicism among individuals within organizations that have heard the mantra about potential synergies between partner organizations before, only to see such attempts unwind due to lack of effective leadership or actual results.

¹⁸ “The Economics of Ecosystems and Biodiversity (TEEB) for Business Report.” www.teebweb.org. TEEB. Web. July 2010.

¹⁹ About The Equator Principles, Equator Principles, at <http://www.equator-principles.com/index.php/about-ep> (last visited June 10, 2012).

²⁰ "Shangri-La's Reef Care Project." www.shangri-la.com. Shangri-La Hotels and Resorts. Web. 15 May 2012.

²¹ Velasquez-Manoff, Moises. "The Economics of Ecosystems." Boston: The Christian Science Monitor. Web. 16 November 2009.

²² A similar, successful strategy discussed by dialogue participants was the one pursued by the Prince of Wales in preparing support for the REDD carbon mitigation program, well in advance (at least two years) of the Copenhagen climate discussions. As a result of those efforts, REDD became one of the few success stories coming out of Copenhagen in 2009, which has led to relatively widespread adoption and funding. Caravani, Alice; Nakhoda, Smita; Schalatek, Liane. "REDD-plus Finance: Brief 5." Heinrich Böll Stiftung North America and Overseas Development Institute. Web. November 2011.

APPENDIX I: PREVIOUS INTERNATIONAL EXPRESSIONS ON SUSTAINABLE DEVELOPMENT

In 1972, a UN meeting in Stockholm led to the Declaration of the United Nations Conference on the Human Environment, which proclaimed that, “Man has a special responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, which are now gravely imperiled by a combination of adverse factors. Nature conservation, including wildlife, must therefore receive importance in planning for economic development.”

The Bruntland Commission Report titled *Our Common Future*, released in 1987 and adopted in a UN General Assembly resolution, addresses the policy changes needed to achieve many of the same stated goals: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs,” the report states. “It contains within it two key concepts: the concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs.”

The United Nations Conference on Environment and Development (Earth Summit), held in 1992 in Rio de Janeiro, led to the adoption by 178 governments of “Agenda 21.” The program includes agreements on combating poverty, promoting sustainable settlement patterns, and integrating environment and development into decision-making. It describes implementation strategies in the fields of science, technology transfer, education, international institutions, and financial mechanisms.

In 1997, the United Nations General Assembly held a special session to assess progress on the implementation of Agenda 21. The results were diplomatically described as “uneven.” Increasing globalization, widening income disparities, and continued deterioration of ecological systems were cited as dominant negative trends.

In 2012, the UN Environment Programme sounded the alarm in its fifth Global Environment Outlook (GEO-5) report, published two weeks before the Rio+20 Conference on Sustainable Development held in Brazil. The UNEP report states that population growth, urbanization and consumption are set to inflict irreversible damage on the planet, and called for urgent agreement on new green targets to save the environment. The GEO-5 report, three years in the making and the United Nations' main health-check of the planet, urges governments to create more ambitious targets or toughen existing ones, most of which have failed to deliver. It also says it is crucial for governments to put a price on natural resources such as mangroves, rivers and forests and include this in national accounts.

APPENDIX II: DIALOGUE PARTICIPANTS

As with all policy dialogues in the Aspen Institute's Energy and Environment Program, the Dialogue Series on Conservation in the 21st Century follows the Institute's time-honored approach to intentional, value-based dialogue, and adheres to a strict not-for-attribution rule. Individuals who participated in the dialogue are listed for identification purposes only – they are not responsible for any errors, nor do they or their organizations necessarily endorse the report's narrative or conjecture.

Ricardo Bayon

Partner

EKO Asset Management Partners

Nancy Birdsall

President

Center for Global Development

James Boyd

Senior Fellow and Co-Director

Center for the Management of Ecological Wealth

Resources for the Future

Scott Burns

Director, Environment Program

The Walton Family Foundation

Audrey Choi

Managing Director and Head

Global Sustainable Finance

Morgan Stanley & Co. Incorporated

Aimée Christensen

Founder and CEO

Christensen Global Strategies, LLC

Sally Collins

Formerly Director, Office of Ecosystem Services
and Markets

U.S. Department of Agriculture

Gretchen Daily

Director, Center for Conservation Biology

Bing Professor of Environmental Science,

Department of Biology

Stanford University

David Edwards

Assistant Director

International Sustainability Unit

The Prince's Rainforests Project

Dean Hirsch

Global Ambassador and Former President

World Vision International

Michael Jenkins

President and CEO

Forest Trends Association

Peter Kareiva

Chief Scientist & Director, Science

The Nature Conservancy

Pablo Lloret

Formerly Director

Fund for the Protection of Water (FONAG)

Steve McCormick

President and Board of Trustees Member

Gordon & Betty Moore Foundation

Charles McNeill

Team Manager, Environment Programme

Advisor, Biodiversity Conservation &

Poverty Reduction

United Nations Development Programme

Rebecca Nadel

Portfolio Advisor, Heavy Oil

Shell Upstream Americas

Mark Nechodom

Formerly Deputy Director

Office of Environmental Markets

U.S. Department of Agriculture

Paul O'Brien

Vice President, Policy and Campaigns
Oxfam America

Raymond Offenheiser

President
Oxfam America

Lydia Olander

Director, Ecosystem Services Program
*Nicholas Institute for Environmental Policy
Solutions - Duke University*

Kung-Ah Park

Managing Director, Environmental Markets Group
Goldman, Sachs & Co.

Glenn Prickett

Chief External Affairs Officer
The Nature Conservancy

Heather Quinley

Director, EHS National Stewardship Strategy
Duke Energy

Janet Ranganathan

Vice President, Science and Research
World Resources Institute

Walt Reid

Director, Conservation and Science Program
The David and Lucile Packard Foundation

Kent Redford

Formerly Director for Biodiversity Analysis and
Coordination
Wildlife Conservation Society

José Salazar

President
*National Superintendency for Sanitation
Services (SUNASS) (Drinking Water
Regulator of Peru)*

M. Sanjayan

Lead Scientist
The Nature Conservancy

Frances Seymour

Director General
Center for International Forestry Research

Katherine Sierra

Senior Fellow, Global Economy and
Development
Brookings

Mark Tercek

President and CEO
The Nature Conservancy

Ray Bolger

Rapporteur
Tech Wire Media

The Aspen Institute

Energy and Environment Program

David Monsma

Executive Director

Nicole Alexiev

Deputy Director

Jack Riggs

Senior Fellow

Tim Olson

Project Manager

Nicole Buckley

Environment Program Manager

Andrea Browne-Phillips

Assistant Director of Administration

Nikki DeVignes

Project Assistant

Kellee Lockwood

Program Assistant



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The Aspen Institute mission is twofold: to foster values-based leadership, encouraging individuals to reflect on the ideals and ideas that define a good society, and to provide a neutral and balanced venue for discussing and acting on critical issues. The goal of the Aspen Institute Energy and Environment Program is to provide the leadership and neutral forum for constructive dialogue on complex policy issues in the areas of energy and environmental policy. The program's unique process, based on rich preparation, an exceptional setting, and a diversity of views, creates an atmosphere highly conducive to openly exploring issues through its renowned intentional dialogue format.

