THE ROCKEFELLER FOUNDATION

Revaluing ecosystems

Visions of a better future

Summary of a meeting hosted by The Rockefeller Foundation

Firms are realizing that they need to care for natural capital because their business models rely on the ecosystems in which they are based.

William Trant Beloe, senior operations officer
The International Finance Corporation

With insights from The Economist Intelligence Unit

Foreword

In November 2013, The Rockefeller Foundation hosted "The Future of Revaluing Ecosystems." This was the second in its series of high-level meetings focused on advancing inclusive economies that expand opportunities for more broadly shared prosperity, and building greater resilience by helping people, communities and institutions prepare for, withstand and emerge stronger from acute shocks and chronic stresses. The Foundation works in four domains to achieve these goals, and those constitute the themes of the meetings: improving cities, ecosystems, health and livelihoods. By bringing together diverse and sometimes opposing perspectives to explore future trends, the convenings serve to strengthen the capacities of leading organizations from around the world to anticipate and adapt to rapidly emerging opportunities and challenges. For more information on the series, please go to www.visionariesunbound.com.

The meeting, held from November 4-7 at the Foundation's Bellagio Conference Center in Italy, was convened by The Rockefeller Foundation and the World Resources Institute. The Economist Intelligence Unit wrote this summary report of the meeting in full, with the exception of the foreword and conclusion, which were written by The Rockefeller Foundation.

The "Future of Revaluing Ecosystems" meeting was convened by the Rockefeller Foundation and the World Resources Institute with support from the Rockefeller Foundation.

THE ROCKEFELLER FOUNDATION

WORLD RESOURCES INSTITUTE

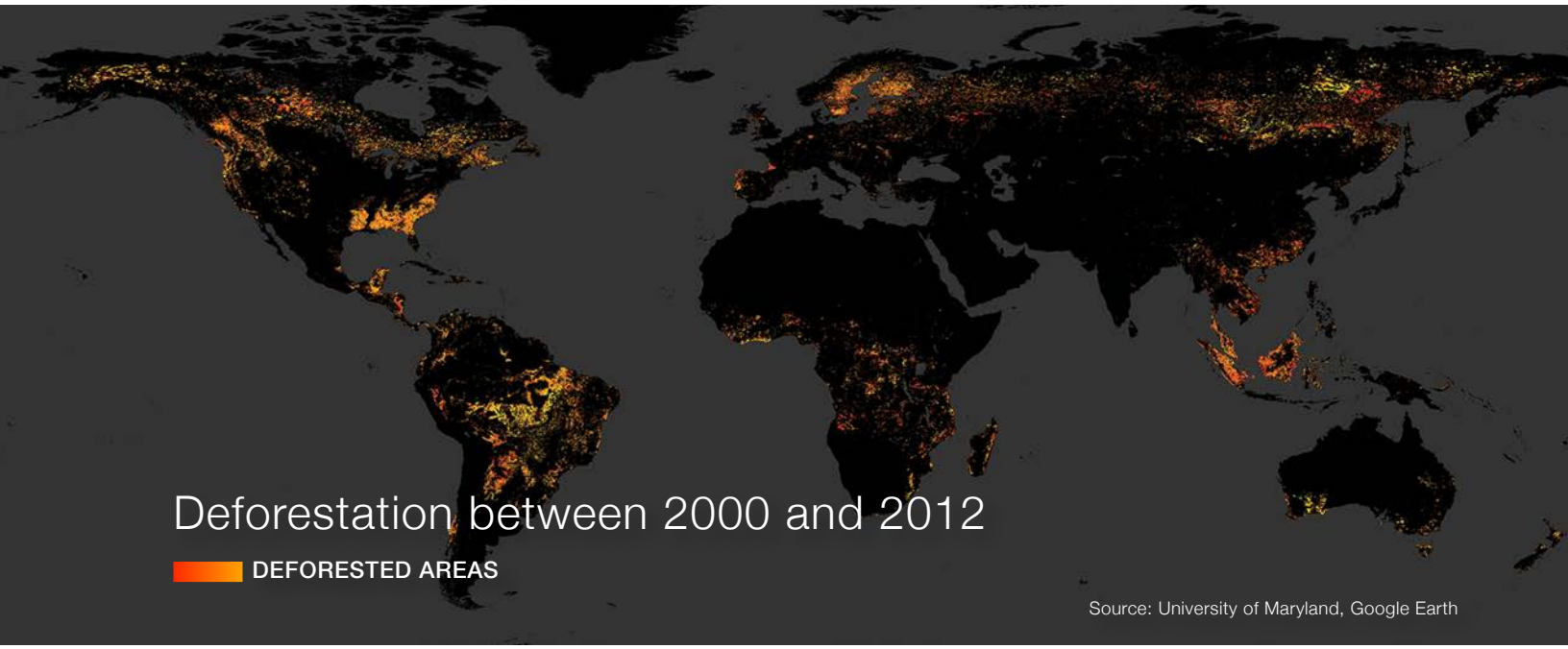
Executive Summary

Ecosystems serve us in many ways. Trees store carbon dioxide and supply timber; their roots anchor topsoil and filter water. Coral reefs are homes for the fish we eat and protect our shorelines. But society has yet to fairly value the vital contributions of such natural capital to human well-being. Meanwhile, ecosystems are deteriorating as a more crowded and affluent world demands more raw materials. Is another future possible?

"Revaluing Ecosystems" brought together 28 experts to explore ways to better measure and manage our planet's natural capital contribution to human well-being.

How do we change the prevalent mindset from one in which nature is viewed as something to be sacrificed for development, to one where nature is perceived to underpin development?

Janet Ranganathan, vice president for Science and Research, the World Resources Institute



Discussion of future trends, related microscenarios and solutions yielded a number of interrelated themes. Key takeaways include:

1. ECOSYSTEM SHOCKS
Storms, floods and drought are impacting communities and companies in potent and personal ways. Rising awareness is sparking action to improve ecosystems.

2. LOCALISM
An upswell of grassroots activity among farmers, entrepreneurs and local governments is injecting energy and resources into long-neglected ecosystems. These local efforts continue despite the lack of global and national CO_2 reduction agreements that might benefit ecosystems.

3. INNOVATION
New communication, information collection and governance tools are helping to better measure and manage natural capital in ways that also benefit communities.

4. DATA
An abundance of open, aggregated and applied data can help us make wise ecosystem investment and stewardship choices.

5. SYSTEMS THINKING
Thinking holistically about ecosystem issues rather than in individual silos can help spark powerful solutions that better address the complex needs and interactions of individuals, communities, economies and nature.

6. MARKET FORCES
Corporations increasingly recognize that their business depends on a steady and reliable supply of raw materials from and services provided by ecosystems. As a result, the private sector has begun to work with nonprofits, governments and local communities to better value and protect ecosystems.

7. TRADE-OFFS
To balance human and ecosystem needs more equitably, the costs and benefits of various ecosystems management options need to be better measured and more clearly communicated.

8. SCALE
By linking and leveraging insights, ideas and resources across sectors, we can replicate transformative solutions on a grand scale.

9. NATIONAL CHAMPIONS
Countries with much to lose and gain from environmental degradation are making ecosystem valuation a priority. These countries may drive change globally.

10. YOUTH AS CHANGE AGENTS
Young people's awareness of the importance of preserving ecosystems is growing and could help change behavior worldwide. Enlightened consumers may spend more to "go green."

Trends, microscenarios and future solutions

Several cities are developing new models for urban growth that integrate natural infrastructure with human infrastructure. We're seeing green and grey in very novel approaches.

Judith Rodin, president, The Rockefeller Foundation

TRENDS

Participants first explored trends that will most influence the ways we value ecosystems by 2025, and their causes, ripple effects and many interconnections.

These trends included **Declining Poverty** and **Rising Urbanization** in developing countries, which are driving demand for fossil fuels, food and water. Rising consumption is leading to increasingly degraded ecosystems. In parallel, rising **Fossil Fuel Use** is accelerating climate change and the likelihood and frequency of **Ecosystem Shocks** such as intense storms and drought. As a result, alternative approaches to **Corporate Reporting** are emerging to more honestly assess how companies consume natural assets and the supply chain and reputational risks they face. The convergence of these trends is also pushing governments to revalue their natural capital through alternative measurements of the Gross Domestic Product (GDP). A new abundance of **Data** and **Digital Technologies** are driving changes in the way ecosystems are valued. Finally, **Localization**, or bottom-up approaches to better meet both ecosystems and human needs, will also open up opportunities for new ideas and practices.

MICROSCENARIOS

Five of the most influential trends and their likely consequences were next explored in-depth through a microscenario exercise, which produced visions of the world in 2025. A scenario based on the trend of **Declining Poverty** suggested that consumption and urbanization will rise. But, better education will also help raise awareness and engagement among youth, who will demand more sustainable practices and products. Exploring the impact of rising **Fossil Fuel** use showed that ecosystem shocks and water conflicts will grow as the competition for water, land, food and energy intensifies. But because scarcity drives value, companies, governments and communities will develop new ways to value ecosystems. **Ecosystem Shocks** will also trigger demand for more sustainable supply chains, farmer-led ecosystem restoration, resilient storm protection, and data sharing among countries. But difficulties aggregating data will persist.

In the same vein, increased social pressure to protect ecosystems will spur more **Corporate Engagement** to quantify natural capital. This will open up opportunities in information and communication, innovation, clean energy and integrated reporting. However a tendency to withhold data may impede

We're not just interested in restoring what we lost, but in better managing what we have.

Bekele Shiferaw, executive director, Partnership for Economic Policy

these efforts. Similar pressures will bring about a dominant global **GDP/ Macroeconomic** measure that incorporates natural assets by 2025. As a consequence, demand for environmental monitoring will rise, and changes in dietary patterns could follow, along with an expansion of the renewable energy industry. Finally, though all these trends create new opportunities, these opportunities also face obstacles such as short-term outlooks, poor incentives, weak governance, limited political will and entrenched interests.

FUTURE SOLUTIONS

Five small working groups explored emerging barriers and opportunities to ecosystems management.

Farmers often lack the financial resources to improve degraded ecosystems. But innovative **Financial Instruments** may help fund farmer-led shifts in agricultural practices. These investments could ultimately help improve agricultural yields and reduce the impact of farming on the environment.

Farmers and rural communities often lack negotiating power with governments and multinationals. But an inclusive, open **Data**-focused, people-centered dialogue could ease negotiations among farmers, governments and companies, with outcomes that benefit all parties—and ecosystems.

Incentives to restore ecosystems remain weak. But new investment vehicles can help raise capital for **Local Initiatives** if stakeholders can access these resources. "Restoration Bonds", for example, target long-term investors interested in the restoration of degraded lands. Similarly, the creation of a new ecosystems ratings agency could help redirect **Capital Flows** into ecosystems management. Such an agency would grade a company on the volume of natural resources consumed and the manner in which they were extracted.

The public is still largely unaware of the links between human consumption and ecosystem degradation. But this lack of understanding can be overcome by appropriate **Communication and Education**. An "EcoImpact" resiliency campaign, for example, could focus on ecosystem shocks such as hurricanes and drought, or on the ways natural structures like sand dunes, reefs and forests have helped save lives and protect property in storms or floods.

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Revaluing Ecosystems:

Visions of a better future

What do we owe the future? How do we realign incentives so that we go from a mindset of scarcity and zero sum to one of abundance and opportunity?

Vijay Vaitheeswaran, China business and finance editor, *The Economist*

Introduction from The Rockefeller Foundation

For more than 50 years, The Rockefeller Foundation's conference center in Bellagio, Italy, has sparked innovations that have helped avert major global crises. The Green Revolution, which developed new ways to boost agricultural production in poorer nations, was expanded to Asia over several Bellagio meetings in the 1960s and '70s. The International AIDS Vaccine Initiative, which incentivized research to develop a vaccine, was born at a 1994 meeting.

In November 2013, The Rockefeller Foundation hosted "The Future of Revaluing Ecosystems." This was the second in its series of high-level meetings devoted to strengthening the Foundation's work toward its dual goals: advancing inclusive economies that expand opportunities for more broadly shared prosperity, and building greater resilience by helping people, communities and institutions prepare for, withstand and emerge stronger from acute shocks and chronic stresses.

The Foundation focuses on four areas to meet its goals, which constitute the themes of the meetings: transforming cities, revaluing ecosystems, advancing health and securing livelihoods. By bringing together eclectic and sometimes clashing perspectives, the organizers hope to expand humanity's ability to anticipate and adapt to trends and challenges. For more information on the series, please go to www.visionariesunbound.com.

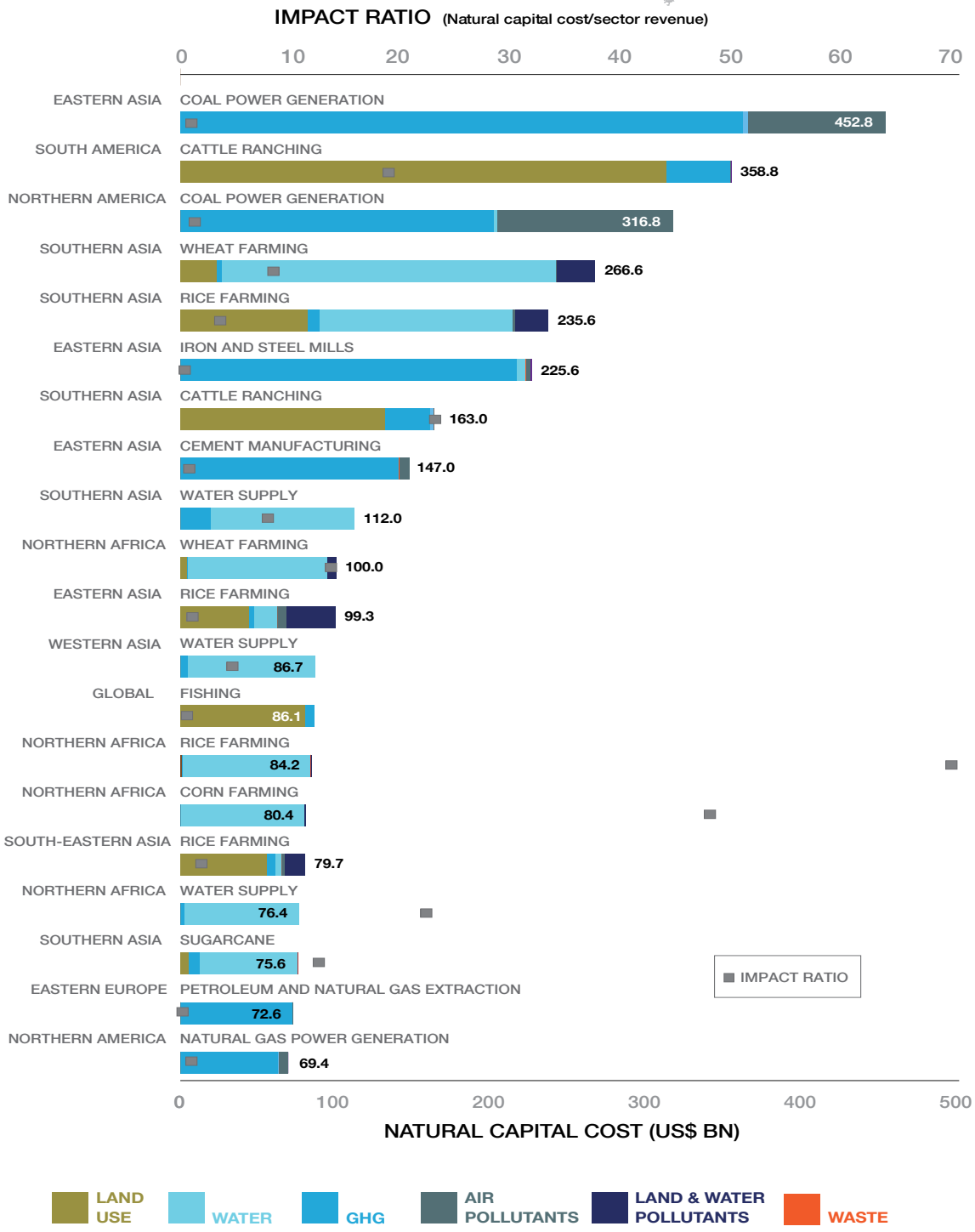
Revaluing Ecosystems

Ecosystems serve us in many ways. Trees store carbon dioxide and supply timber; their roots shore up soil and filter water. Reefs buttress shorelines against storms and serve as feeding ground for marine life. Rainforests and other ecosystems supply pollination, soil erosion and oxygen-emitting services.

But society has yet to fairly value the vital contribution of this "natural capital." Meanwhile, our ecosystems are deteriorating as a more crowded and affluent world demands more raw materials. Shifting temperatures and tastes in the coming decades evoke images of increasingly degraded ecosystems. The poor and vulnerable will suffer most because they often depend directly on their ecosystems for their food and livelihoods. Is another future possible?

Big environmental footprints

Industries most impacting the environment in 20 regions, in $ terms



Source: Natural Capital at Risk, TEEB and TruCost, 2013

The deterioration of our ecosystems requires urgent attention. The world lost 880,000 square miles of forest between 2000 and 2012, or an area about the size of the United States east of the Mississippi River, according to a recent study published in *Science*. We have also lost over 20% of our mangroves since 1980[1], and the Great Barrier Reef has lost half its coral in the last 27 years[2]. As a result, we have fewer ecosystems to anchor the soil, protect shorelines and serve as feeding ground for fish.

Many of these fragile ecosystems are in Asia and Africa, where increasing demand for food, water and goods are putting additional pressure on ecosystems. Africa's population alone is slated to more than double, to 2.4 billion by 2050 from 1.1 billion in 2011[3]; the continent's per capita income will more than triple by 2060[4].

"The data are clear. The climate is changing at a faster clip than at any other time in history," cautioned Judith Rodin, The Rockefeller Foundation's president, at the meeting's opening. "The demographic shifts are equally compelling. This is putting an unprecedented strain on the ecosystems that we all depend on for our livelihoods. None of this will change without interventions. We need more arrows in our quiver. We need a conservation-plus approach."

The 27 experts from government, industry, development banks, non-governmental organizations and universities who gathered in Bellagio arrived eager to explore trends and their trajectories to better measure and manage our natural capital.

Participants included:

- William Trant Beloe, a senior operations officer at the International Finance Corporation and an expert on financing sustainability programs in China
- Holly T. Dublin, director of strategies at The B Team, a consultancy that works with private companies such as Puma on environmental profit-and-loss statements
- Agnes C. de Jesus, senior vice president at the Energy Development Corporation in the Philippines, a renewable energy company that has long viewed local communities as stewards of the geothermal sources on which the company depends
- Dr. Bob Scholes, a systems ecologist at the Council for Scientific and Industrial Research in South Africa with rich data aggregation expertise
- Luc Gnacadja, former assistant-secretary-general and executive secretary at the United Nations Convention to Combat Desertification, and a longtime champion of land-degradation neutrality, or the idea that for every hectare of land damaged, another hectare is restored.
- Dr. Huaying Zhang, vice president, sustainability in Coca-Cola's Greater China & Korea Business Unit

(See the full list of participants at the end of this report.)

[1] *The World's mangroves 1980-2005*, The UN Food & Agriculture Organization, 2007
[2] *The Great Barrier Reef and Crown-of-thorns*, Australian Institute of Marine Science, 2012
[3] *World Population Data Sheet*, Population Reference Bureau, 2013
[4] *Africa in 50 Years Time: The Road Towards Inclusive Growth*, African Development Bank, 2011

We've leapt to a future in which corporate risk is tied to the state of ecosystems.

Fred Boltz, managing director, Ecosystems, The Rockefeller Foundation

Robert Garris, managing director of the Rockefeller Foundation's Bellagio Programs, led the event series. Fred Boltz, managing director for ecosystems at the Rockefeller Foundation, led the Revaluing Ecosystems event framing and dialogue structure. Lauretta Burke, senior associate in the People and Ecosystems Program at the World Resources Institute, directed the event with an insightful and provocative overview of the current state of ecosystems and methods to value them. The Economist Intelligence Unit contributed a special anthology of reprinted articles on ecosystems from *The Economist*, and Vijay Vaitheeswaran, the publication's China business editor, led a wrap-up session. Finally, Sally Uren, James Goodman and Hugh Knowles of the Forum for the Future, an organization with future-visioning and scenario-development expertise, conducted valuable pre-meeting research, shaped the agenda and facilitated the sessions.

Participants identified some of the complex, interlinked trends that affect global ecosystem quality. They also explored how our limited understanding and appreciation of the goods and services ecosystems supply often leads to ecosystem degradation. They examined the barriers to and opportunities for positive change in how humanity interacts with and values ecosystems. Finally, participants identified six areas of dynamism, where there may be future opportunities to better measure and manage ecosystems.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3. Impact
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GENCY
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Pension Funds
Insurance Cos
Bringing the future
better decision-making

The conversation

We have pushed our ecosystems to such a point that they are coming close to breaking. The solution is clear. But this cannot be solved by any one person. It has to be cross-organizational.

Huaying Zhang, vice president, Sustainability, Coca-Cola Greater China & Korea Business Unit

The resilience of our ecosystems depends on a complex mix of environmental, industrial, agricultural, economic, political and societal factors. What will ecosystems be like in 2025? What can we do to restore and better manage them?

Common observations that point to overlapping areas of opportunity to effect change include:

1. ECOSYSTEM SHOCKS. Storms, floods and drought are impacting communities and companies in potent and personal ways. Rising awareness is sparking action to improve ecosystems.

2. LOCALISM. An upswell of grassroots activity among smallholder farmers, entrepreneurs and local governments is injecting energy and resources into long-neglected ecosystems. These local efforts continue despite the lack of global emissions reduction agreements that might benefit ecosystems.

3. INNOVATION. New communication, information collection and governance tools are helping us better measure and manage natural capital in ways that also benefit communities. These tools include remote sensing, real-time monitoring, predictive analytics and the mobile Internet. Green products and flexible, open and data-centric approaches also challenge convention and may lead to disruptive, positive change.

4. DATA. An abundance of open, aggregated and applied data can help us make wise ecosystem investment and stewardship choices. Data can also be a powerful lever to broadcast successes or to “name and shame”.

5. SILOED THINKING. Thinking holistically about ecosystem issues rather than in individual silos can help spark powerful solutions that better address the complex needs and interactions of individuals, communities, economies and nature.

6. MARKET FORCES. Corporations increasingly recognize that their business depends on a steady and reliable supply of raw materials found in and services provided by ecosystems. As a result, the private sector is increasingly working with other sectors and local communities to better value and protect ecosystems.

7. TRADE-OFFS. To better balance human and ecosystem needs, the costs and benefits of ecosystems management need to be more broadly and clearly communicated.

8. SCALE. By linking and leveraging insights, ideas and resources across sectors, we can create transformative solutions on a grand scale.

9. NATIONAL CHAMPIONS. Countries with much to lose and gain from environmental degradation are making ecosystem valuation a priority. These countries may drive change globally.

10. YOUTH AS CHANGE AGENTS. Young people's awareness of the importance of preserving ecosystems is growing and could help change behavior worldwide. Enlightened consumers may spend more to "go green."

Trends, microscenarios and future solutions

1

TRENDS

1. TRENDS

For a sense of how humans and ecosystems might interact in 2025, participants first identified the most powerful trends—positive and negative—that are shaping our relationships with ecosystems. These trends will influence future economic, political, social and technological developments that might help improve how ecosystems are measured and managed.

Organizers started with 100 trends identified in pre-meeting interviews with participants. They then narrowed them down to the 12 most cited in the interviews and subsequent discussions. Futurescaper, an analytical tool developed at the Massachusetts Institute of Technology, helped measure trends for frequency and correlation with other trends, with a focus on pressure points and drivers.

We're talking about trade-offs. The conversion of forests to farmland has greatly increased food production. But we've lost ecosystems and their services.

Lauretta Burke, the World Resources Institute

1. Declining poverty

The demand for goods and services is rising as much of the world becomes more affluent. This increases pressure on the ecosystems that contain raw materials for food, beverages and consumer goods. At the same time, improved education and incomes are helping to spark interest and public and private sector investment in ecosystem valuation.

2. Urbanization

Soaring population growth in cities is putting additional stress on already strained ecosystems that supply water, energy, storm protection and other critical services to urban areas. Because poor populations often live in vulnerable sections of growing coastal cities, they will suffer most from climate change—induced weather shifts.

3. The food-water-energy nexus

The interdependence of water, food and energy and their shrinking supply is leading to more conflicts over their use. Water is often the first to fail and is thus the most likely to receive urgent attention.

4. Food security

Fears about insufficient food supplies are spurring some governments to be more aggressive in their efforts to own and manage agricultural land. Some governments are also more involved in agricultural exports. As a result, local farmers often suffer.

5. Siloed thinking

The competition for water, land and other natural resources is leading groups with vested interests to address problems individually, instead of proposing holistic, integrated solutions.

6. Fossil fuel use

Rising affluence is triggering more demand for fossil fuels for cars, factories, heating and air conditioning. This, in turn, is accelerating climate change.

7. Ecosystem shocks

Storms, floods and drought will increase in frequency and intensity as the planet's temperatures rise further. These natural disasters will encourage communities, countries and companies to take a more active interest in ecosystems.

8. Corporate reporting

Companies are developing alternative ways to account for the natural assets they need and use. They are better assessing the risks that ecosystem degradation and climate change pose to their supply chains and reputations.

On the big screen:

The Decision Theater for data-rich collaboration

Conflicts over water use, disease management and other hot button issues often pit one group against another, making compromise impossible. With the proper information and guidance, however, finding common ground may be easier than anyone thought possible.

Arizona State University's Decision Theater aims to provide groups in complex, heated negotiations a neutral space in which to meet and the data and tools for collaborative decision-making—all to help them achieve win-win outcomes. The "theater" is an 8,000-ft triangular room with three floor-to-ceiling screens that project constantly updated information. Up to 30 participants can meet in this neutral setting to discuss complex subjects with the help of videos, data, 3D geospatial visualizations and simulation models. Prior to and during the discussions, participants can also call on the university's experts in policy informatics, design, geography, computer science, business, psychology and math.

As the discussions proceed, parties with firm points of view are often surprised to find that their assumptions or forecasts may be ill-founded or may shift as they make split-second, on-site calculations. Occasionally, participants realize that their interests and those of the opposing party are not as misaligned as they thought. The Decision Theater has helped groups deadlocked over pandemic flu and water management to agree on basic issues, thus making further progress possible.

We measure what we treasure. That's not yet the norm when it comes to ecosystems. But it should be.

Vijay Vaitheeswaran,
The Economist

9. GDP in macroeconomics

Governments are also revaluing their natural capital through alternative measurements. After years of debate, many governments are revisiting the validity of GDP as a measure of progress.

10. Data

Abundant data and new ways to share, aggregate and analyze data will help convert noise into meaningful information, enabling more accurate measurements of ecosystems.

11. Digital technologies

The availability and ubiquity of communications tools such as smartphones now make it possible for communities to share, act on and innovate based on accurate, current and critical information. By exchanging and using such information, groups can make wise decisions and investments.

12. Localization

New ways of organizing, governing and addressing ecosystem degradation are emerging at the grassroots level throughout the world.

2. MICROSCENARIOS

The five trends most likely to shape human and ecosystem interaction by 2025 were next explored in depth in "microscenarios." These mini-visions of the future allowed participants to analyze how current strategies and future projects will be affected if trends intensify, wane or converge with other emerging trends. Participants discussed the direct and indirect consequences of these shifts and their overlapping and interdependent drivers. They also singled out the winners, losers, barriers and dynamic areas of overlapping opportunity associated with each Microscenario.

1. Declining poverty

KEY INSIGHT: By 2025, better livelihoods will lead to better policy decisions, education, communication, technology, corporate innovation and management of ecosystems.

An expanding middle class, more consumption and new lifestyle choices in much of the world will initially overburden ecosystems as demand for mobility, water, food, energy, goods and services rises. But, over time, improved livelihoods will have a positive effect on policy decisions, education, communication, technology, corporate innovation and the management of ecosystems. Collectively, these changes will increase awareness of the link between ecosystems and the benefits ecosystems provide. Youth will also be more engaged in environmental issues. These and other forces will spur demand for more green products, local ecosystem restoration, business-led ecosystem valuation, and government-led green initiatives. But short-termism, insufficient information about the benefits of green investment, political deadlock and poor incentives will make progress uneven across geographies and sectors.

There is a proliferation of effective local initiatives. There's a lot of evidence for people and communities taking responsibility for their own lives and the planet.

Charles McNeill, senior policy advisor, Environment & Energy Group, United Nations Development Programme

2. Fossil fuel use

KEY INSIGHT: Rising fossil fuel use will trigger more ecosystem shocks. But it will also trigger competition for resources, technological innovation, and global pressure for a climate agreement.

More fossil fuel use and rising CO2 emissions will impact climate change. This will trigger more ecosystem shocks such as extreme weather, drought and floods. Disease, pollution, and environmental degradation will follow. The competition for water necessary to supply both food and energy will also lead to more conflicts over these three areas, particularly between urban and rural areas. At the same time, better livelihoods will boost education and awareness of how fossil fuel use affects the environment. As a result of these powerful forces, government sentiment will shift in favor of a global climate change agreement and demand will rise for

renewable energy. Winners will include companies with expertise in renewable energy, energy efficient transportation providers and low-carbon supply chains. Losers will include indigenous communities, populations near energy resources or in areas that are more threatened by climate change—induced weather shifts, farmers who are unprepared for climate change, and coastal cities. All these trends will lead to new political movements, more sustainable supply chains and geopolitical power shifts to the newly oil-rich nations of Africa and Latin America that will provide opportunities for change. But weak governance and entrenched interests may hobble these efforts.

3. Ecosystem shocks

KEY INSIGHT: As ecosystem shocks boost awareness of the link between human well-being and ecosystem health, ecosystem valuation and management will improve.

Ecosystem shocks will be more frequent and affect more people. These shocks will lead to more fragile and fragmented ecosystems, extreme weather, disease, income disparity and volatile food and water supplies. In response, regional conflicts and supply chain risks will rise. But so will the perceived value of natural habitats in buffering vulnerable areas against storms. As a result, the private sector will become more engaged in ecosystems management. Rural and urban planning, predictive modeling, ecosystem restoration and investment, and local responses to climate change will also increase. The winners will be communities located far from flood zones and innovative businesses. The losers will include businesses dependent on coastal resources, communities in areas most affected by climate change and those in both coastal areas and the interior that depend on healthy ecosystems. New opportunities will emerge in sustainable supply chains, community-led ecosystem restoration, corporate ecosystems valuation, collective land governance and increased data sharing between and among countries and businesses. But barriers such as scarce resources, entrenched interests, short-term time horizons, limited political will and difficulties aggregating data will persist.

There's nothing that focuses the mind more than a catastrophe.

Tundi Spring Agardy, director, Marine Ecosystem Services, Forest Trends Association

4. Corporate engagement

KEY INSIGHT: The scarcity of natural resources and volatility in supply chains will drive greater corporate innovation in green accounting practices, renewable energy development and sustainable supply chains. These trends will ultimately help level the playing field among environmental leaders and laggards within the private sector, through new policies.

The tragedy of the commons cannot be solved alone.

Huaying Zhang, Coca-Cola

More frequent and extreme ecosystem shocks will spark more social and corporate pressure to protect ecosystems. As a result, corporations will increasingly quantify the costs and impact of natural resources extraction and ecosystem services use; youth consumption patterns will also change. Innovative business models, materials and technologies will enable this shift. Some other notable innovations will include new renewable energy technologies, new ways to disclose environmental impacts and dependencies in the supply chain to better assess risk, more accurate reporting, and improved decision-making.

But, because such practices will not enter the mainstream, the true impact of these changes on ecosystems is uncertain. Barriers such as short-term thinking, data hoarding, vested interests, conflicts over diminishing resources and corruption will persist.

5. GDP/Macroeconomics

KEY INSIGHT: As new ways emerge to better measure our natural assets, monitoring of ecosystems and incentives to better manage them will also improve.

By 2025, steadily rising social and corporate pressure will lead to the adoption of new GDP measures that incorporate the value of certain environmental resources. These alternative measures will likely assess the value of forests, water and carbon. Pollination, soil protection, disease control and other services that ecosystems provide will not be listed, because they are more difficult to measure. More real-time data and remote sensing applications will make such accounting changes possible. As a result, the link between sustainable development and economic development will become clearer.

Many opportunities will emerge from this shift as governments change their policies and regulations to reflect the values incorporated into broader GDP measures. These measures will help end subsidies that work against sustainable ecosystems management.

Winners will be smallholder farmers, institutions involved in tracking ecosystems, accounting firms, and the health, education and clean-tech sectors. Losers will be extractive industries and agribusinesses that continue to farm in ways that degrade the environment. Economic uncertainty, patchy data and standardization will impede progress. Entrenched interests may initially question the science and economics of these efforts, which may also hinder progress. “We have technology innovation. We need policy innovation,” said J. Carl Ganter, director at Circle of Blue.

3. FUTURE SOLUTIONS

The conversation next shifted to sketching out possible future solutions for revaluing ecosystems. These solutions grew from assumptions that emerged in microscenario discussions. Five working groups explored ways that intersecting, dynamic interests could be integrated into opportunities to create a very different future by 2025. Smallholder farmers were the focus of several of these groups.

1. Data: Open data + inclusive dialogue = better decisions

Traditional approaches to managing ecosystems and reducing poverty often pit human needs for natural resources against the desire to protect ecosystems. New Integrated Assessment Models, such as the "Global Change Assessment Model," have helped evaluate trade-offs, creating the possibility of "win-win" outcomes that reflect the benefits communities receive from ecosystems. But successfully applying such models is challenging and time consuming, particularly at the community level.

A better approach puts people at the center of the process to understand, develop and act on solutions that create value for all participants. This more inclusive method addresses incentives and builds on the knowledge of all those in the community, business and government involved in urban, rural, regional and even national negotiations. (see 'Decision Theater' on page 18).

A Peace Corps–type group using volunteers who travel the world to help implement such ecosystem service trade–off analyses in a transparent and standard way would make this method possible on a larger scale. Philanthropy might fund its initial growth; public-sector backing may follow if this approach shows that it can help communities, governments and businesses broker difficult decisions. (See Decision Theater on page 18).

2. Financial instruments: New vision for agriculture

The scarce financial resources available to farmers means it is difficult for them to make long-term investments that can help improve degraded rural ecosystems. A holding company structured as a sustainable farming cooperative that requires smallholder farmers to farm sustainably might help resolve the problem. More resources, shared ownership and better returns would encourage farmers to restore ecosystems.

SABMiller's efforts to help thousands of African farmers sustainably boost cassava yields speak to the potential of such a structure. "The long-term degradation of our supply chain is creating unmanageable risk," recounted David Norman, senior manager of Sustainable Development Policy at SABMiller.

A large corporation that guarantees prices and purchases could reduce risks for farmers. An intermediary such as a multilateral agency or social enterprise that manages this type of smallholder company could cut transaction costs considerably. The result: higher crop prices, greater investment returns, better governance, the restoration of ecosystems and the implementation of sustainable farming practices.

GDP is a poor measure of planetary welfare.

Charles McNeill, United Nations Development Programme

The world of science and the world of business speak very different languages. We are not always talking about the same thing.
Holly T. Dublin, director of strategies, The B Team

Company-led Philippines reforestation program plants trees—and builds community ownership

When forests are felled, the tree roots that shore up soil go with them. The result: erosion, lower soil fertility and silt runoff into watersheds. This impacts both rural dwellers that rely on clean sources of water for nourishment and sanitation, and local farmers and fishermen who, likewise, suffer from fewer nutrients in the soil and a diminished water supply. Each hectare of forest converted to farmland can add up to 40 tons of silt to local waterways.

That amount of silt also presented a problem to the Energy Development Corporation (EDC), a privately owned renewable energy company in the Philippines that generates nearly all of its energy from hydroelectric plants and geothermal wells. It needed to protect the company's ability to generate electric power. Without trees, water often fails to seep deep into geothermal wells.

Given the aligned, mutual interests of EDC and rural dwellers, the company turned to local communities who also stood to gain from planting trees near watersheds to prevent soil erosion. By asking local inhabitants to help restore degraded lands and thus the watershed, the company reasoned, they might begin to serve as stewards of their total ecosystems.

EDC started 20 years ago by encouraging local residents to plant fast-growing species of trees; some individuals also earned income from selective tree-cutting. Little by little, EDC's efforts grew.

In 2009 it began planting indigenous and rare trees with remarkable success. It identified 96 of these species and mounted a massive information campaign to inspire schools and institutions to host and maintain the planted trees.

EDC is producing a website where sponsors can name trees online and track the growth and ecosystem services of the trees they have "planted." The program has helped to build awareness about deforestation and encouraged a sense of ownership in local populations. To date, EDC and its 91 partner organizations have helped plant more than 10,000 ha of forest.

3. Local initiatives: Restoration Bonds

Efforts to encourage sustainable farming practices have suffered from a lack of capital, particularly at the local level. New envisioned vehicles to fund ecosystems restoration may help. "Restoration Bonds," for example, promise positive long-term returns for investment in degraded lands by improving their yields and provision of ecosystem services. These strategies are based on new ways to finance the short-term costs to reap more long-term benefits. They also draw on new data that allow bankers to more accurately estimate the future potential of these lands. Investors might include venture capital firms and long-term investors seeking yield or a positive impact on ecosystems and rural communities. Suggested sites for such bonds include the Atlantic Forest in South America and the Sahel in Africa.

4. Capital flows and investments:
An environmental-risk ratings agency

Consensus is growing that fossil fuel investments will be at risk if global CO2 emission agreements are strictly enforced. This has caused a variety of investors to be concerned about the long-term risks and rewards associated with their investments. This issue preoccupies many activist and socially conscious investors as well as pension fund and long-term investors in the reinsurance industry. “These risks are material and aren’t incorporated into annual reports,” said Ricardo Bayon, partner and co-founder of EKO Asset Management Partners.

A long-term risk ratings agency could grade a company on the sustainability of the company’s natural resources extraction processes, and the subsequent risks to the resiliency of its supply chain and ecosystems on which it depends. Better data collection, analytics, reporting standards and pressure from more credible sustainability accounting standards boards might drive this shift. Corporate adherence to such market-based assessments of assets and liabilities could push companies to more fairly value the source of their inputs and, by extension, to improve accountability and their ecosystems stewardship. Ratings would be based on scenario analyses.

In the past, there’ve been two parties—a buyer and a farmer, focusing only on market prices. Today, multiple parties on a team hold all parties accountable to protect nature. A public partnership with Coke’s requiring suppliers to practice sustainable sourcing increases accountability and the value placed on ecosystems.

Huaying Zhang,
Coca-Cola

Dow Chemical and The Nature Conservancy study how marshes prevent or reduce damage from storms and floods in Texas

Floods and storms are wreaking havoc along coastal areas in the Gulf of Mexico. Key causes include rising temperatures linked to climate change and more seaside construction. In fact, the US has lost half of its coastal marshes in the last century, much of that from development. The result: erosion, shifting shorelines, and hurricanes and floods that occur more often, with more intensity.

Worldwide, damage from such colliding forces added up to $380 billion in 2011, with 37% of that from storms and floods. These were the largest losses on record, according to global reinsurer Munich RE.

Companies with coastal facilities are paying attention. Storms threaten to disrupt their operations, supply chains and stored goods. Firms are also exploring ways to shore up coastal areas, using both engineered infrastructure and natural habitats, to prevent or reduce the damage from natural disasters. And for solutions they are turning to experts in environmental organizations that just decades ago were considered adversaries.

Dow Chemical is one such company. After Hurricane Ike, a category 4 storm, devastated the Gulf in 2008, Dow executives realized they needed to act to protect their Freeport, Texas salt dome facility. They forged ties with The Nature Conservancy in 2011, to explore the right mix of "green" infrastructure such as marshes and "grey" infrastructure such as levees.

Specifically, both organizations seek to measure the value of such ecosystems in protecting property, and to compare the costs and outcomes with those of man-made infrastructure. Ecosystems such as marshes, mangroves, dunes and coral reefs serve as buffers, by reducing wave heights, flooding and erosion. They can also adapt over time and require less maintenance than hard infrastructure. Green infrastructure might bring other benefits, like filtering water, absorbing carbon dioxide, protecting larger areas against storm surges or serving as home for endangered species or nature parks (two National Wildlife Refuges are near Dow's salt-extraction site).

Quantifying these benefits will help Dow and similar businesses make long-term infrastructure investment decisions. The preliminary results, released in 2013, are encouraging.

3

FUTURE SOLUTIONS

5. Communication and education

Communities, companies and individuals rarely understand the impact of their activities on ecosystems. A "Make Resilience Visible" campaign before and after ecosystem shocks such as hurricanes, floods or drought could raise awareness and inspire action through timely and relevant narratives about resilience and rebuilding. A coordinated program could raise local, national and global awareness about how natural elements such as sand dunes, reefs or forests help save lives or money. Simple messages with immediacy that communicate the human, personal impact would resonate best.

Campaign components might include a network command-and-control strategy to manage continuous and cumulative updates; a "rapid-response kit" for affected regions with social media and collaborative tools; a speakers' bureau; naming climate change–induced shocks that haven't previously been named, such as tsunamis, droughts and floods; maps and open source, real-time information; and twinning cities with similar vulnerabilities. Winners would be ecosystems, communities, more stable countries, engaged companies and a broader understanding of ecosystems' value. "We want to create community around a catastrophe by championing positive stories of how nature helped," said J. Carl Ganter of Circle of Blue. For more information on this topic please go to http://www.youtube.com/watch?v=lyL272Q1N0s

Conclusion

The powerful trends highlighted in this report—growing cities, increasing wealth, rising consumption and ecosystem shocks—will shape ecosystems over the next 12 years. During this period, we are also likely to see data become more abundant and new models that use this data to balance human and nature's needs. Improved communication among different stakeholders could encourage us to better value the contributions of our ecosystems and ultimately lead to their restoration.

Thought leaders assembled at The Rockefeller Foundation's Bellagio Center by the Foundation, the World Resources Institute, the Economist Intelligence Unit and Forum for the Future were tasked with envisioning a different way of caring for our ecosystems.

In this vision, communities, companies and countries will work together to improve the natural capital that sustains and serves them. They will use data to assess nature's true worth and use technology to disseminate this information. They will collaborate across sectors using models, market forces and trade-offs to create shared value and build scale. They will make the most of youth and national and corporate champions to inspire behavioral change that will ensure healthy ecosystems in perpetuity.

Insights from this meeting series can be found on the Visionaries Unbound digital hub (www.visionariesunbound.com), which also includes insights from the "Transforming Cities" meeting held in August. Information from future meetings on health and livelihoods will appear in the coming months. The hub aims to provoke thought, support ideas and engender action among a wider audience. Restoring our ecosystems—from the arid lands of Africa to the lush rainforests of South America—will require varied and innovative leadership as we chart a course toward a future that more deeply values our ecosystems.

THE ROCKEFELLER FOUNDATION

The future of revaluing ecosytems

Meeting Participants

Top, left to right: William Trant Beloe, J. Carl Ganter, Laurent Sedogo, Bob Scholes, Robert Winterbottom, David Norman, Bekele Shiferaw, Samuel Kwong, David Meyers, Charles McNeill, and Tundi Spring Agardy

Middle: James Goodman, Ricardo Bayon, Hugh Knowles, Fred Boltz, Sally Uren, Janet Ranganathan, Robert Garris, Frineia Rezende, Luis Basterra and Huaying Zhang

Bottom: Pedro Leitão, Janaki Alavalapati, Lauretta Burke, Riva Froymovich, Judith Rodin, Holly T. Dublin, Luc Gnacadja, Rebekkah Hogan, Agnes C. de Jesus, Carolyn Whelan and Vijay Vaitheeswaran

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