

#globalcommons

The Opportunity of the Commons



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



A scenic view of a river flowing through a valley with steep, forested mountains under a blue sky with clouds. The mountains are covered in dense green vegetation, and the river is a deep blue. A small boat is visible on the river in the distance.

All life on Earth depends on clean air and water, biodiversity, and healthy forests, land, oceans and a stable climate. These global commons—the ecosystems, biomes and processes that regulate the stability and resilience of the Earth system—are the very foundation of our global economy and modern society. Today, they are facing an all-too familiar tragedy of over-exploitation and rapid degradation.

A Defining Moment

We stand at a defining moment for the future of the planet and human well-being. The Global Commons—the ecosystems, biomes and processes that regulate the stability and resilience of the Earth system—are being stretched to breaking point.

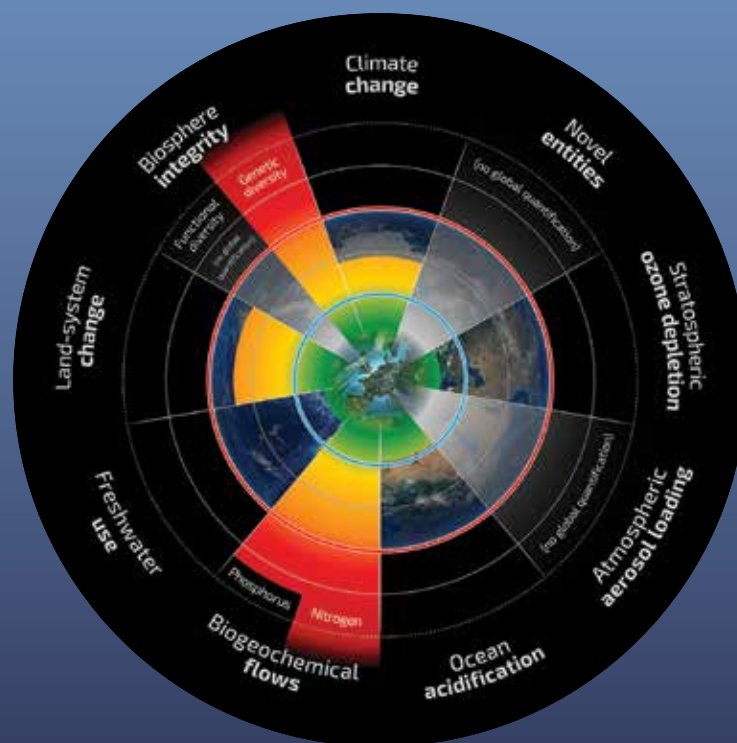
Scientists warn that the “planetary boundaries”, that have ensured the stable conditions that have enabled all civilizations to form and prosper over the last 11,000 years are being strained, and in some cases, exceeded. Indeed, they add, we have forced our way out of the Holocene geological epoch—the only one known to be able to support a growing world population of 7.4 million—to begin a new one, the Anthropocene.

Johan Rockström, Executive Director Stockholm Resilience Centre

Goodbye Forever, Friendly Holocene

“It is time to re-evaluate our economic and political models for the Anthropocene. The starting point must be our very notion of the global commons... Industrial societies now wield astonishing power. Earth’s future is in the balance and we must handle it with care and respect.”

Several of the planetary boundaries have already been breached. These include; biodiversity, now being lost at a rate unprecedented in the last 65 million years; land use change, where nearly a third of forest cover has been cleared worldwide and almost a quarter of the total land area under human use is being degraded; and climate, where atmospheric concentration of carbon dioxide now exceeds 400 parts per million, their highest level in 800,000 years. Meanwhile the greenhouse gas is also acidifying the oceans, changing their chemistry faster than at any point in perhaps 300 million years.



Source: Steffen et al. 2015. Planetary Boundaries: Guiding human development on a changing planet. Science Vol. 347 no. 6223

Changing Risk Perceptions

It is increasingly being recognized that a deteriorating global environment poses significant risks to prospects for future economic growth and development. In the World Economic Forum's 2017 Global Risk report, environment-related risks feature among

the top-ranked global risks. Specifically, four of the top five perceived risks in terms of impact identified in this year's Risk Report were environmental risks. Ten years ago, none of the top five risks were an environment risk.

Christiana Figueres, Former Executive Secretary of the UNFCCC, Convener, Mission 2020

Why 2020 is a Critical Milestone on Our Journey to a Climate-Safe World

“We are at a precarious point for the fate of the global commons. Our actions on climate protection over the next few years will determine whether we continue on a path of exponentially growing national disasters, or pivot onto a path toward a safer, more prosperous world.”

Dominic Waughray, Head of Public-Private Partnership, Member of the Executive Committee, WEF

Three Wicked Problems of the Commons

“Someone will have to do all this, and soon, or these wicked problems will come home to roost, and we will never properly address the competing challenges of managing our global commons and ensuring needed economic development. Then, as ever, it is likely to be the poorest people who will lose out.”

Keith Tuffley, Managing Partner and CEO, the B Team

Business is on Thin Ice—As I Found in an Antarctic Crevasse

“We need many corporate champions to save our ice—and thus our precious planet and humanity itself. This is the private sector's moment in history to act, mobilize and bring solutions.”

Changing Global Risk Perceptions: From Economic and Social to Environmental

Top 5 Global Risks in Terms of Likelihood

	2007	2012	2017
1st	Breakdown of critical Information Infrastructure	Severe income disparity	Extreme weather events
2nd	Chronic disease in developed countries	Chronic fiscal imbalances	Large-scale involuntary migration
3rd	Oil price shock	Rising greenhouse gas emissions	Major natural disasters
4th	China economic hard landing	Cyber attacks	Large-scale terrorist attacks
5th	China economic hard landing	Water supply crises	Massive incident of data fraud/theft



Economic



Environmental



Geopolitical



Societal



Technological

Top 5 Global Risks in Terms of Impact

	2007	2012	2017
1st	Asset price collapse	Major systemic financial failure	Weapons of mass destruction
2nd	Retrenchment from globalization	Water supply crises	Extreme weather events
3rd	Interstate and civil wars	Food shortage crises	Water crises
4th	Pandemics	Chronic fiscal imbalances	Major natural disasters
5th	Oil price shocks	Extreme volatility in energy and agriculture prices	Failure of climate change mitigation and adaptation

Source: Adapted from WEF (2017). *The Global Risk Report*, 12th edition.

The World is Responding

Up to now, the transition into the Anthropocene—momentous though it is—has been largely ignored, figuring little in public policy or private discourse. Fortunately, there are signs that this is beginning to change.

The Sustainable Development Goals, adopted by the world's governments in the autumn of 2015, are designed to set development and growth on a new track, ending poverty and increasing prosperity, while safeguarding the global commons. So is the Paris climate agreement, struck the following December, which aims to bring net emissions of greenhouse gases down to zero in the second half of the century. Countries will submit updated climate plans—called nationally determined contributions (NDCs)—every five years, thereby steadily increasing their ambition in the long-term.

Multi-Stakeholder sustainability platforms have also proliferated in recent years, including the Bonn Challenge—which brings together 40 countries, the private sector and civil society around commitments to restore around 150 million hectares of degraded land—and RE100, an energy-related collaborative, global platform in which leading businesses are encouraged to set a public goal to procure 100% of their electricity from renewable sources of energy by a specified year. Other initiatives focusing on delivering concrete action in specific areas include The Tropical Forest Alliance 2020 (TFA 2020), the Trash Free Seas Alliance, and C40, a network of the world's megacities committed to addressing climate change. This momentum reflects a growing recognition from business of the economic opportunities that exist.

Peter Bakker, President, World Business Council for Sustainable Development

A Wealth of Opportunities

“*Business is in a unique position to observe and intervene in many issues facing the global commons — from reducing emissions and addressing climate change, to stopping ocean pollution and fixing broken food systems. Across the world, companies are stepping up to meet the challenge.*”

Mark Malloch-Brown, Chair of the Business and Sustainable Development Commission

Transforming Globalisation

“*What we need—and urgently—is a radical shift in perception by the private sector to view the global goals as the greatest economic opportunity any generation has had, rather than a burden and constraint to growth.*”

The Global Environment— A Foundation for the SDGs



**Nebojsa Nakicenovic, Deputy Director General/Deputy Chief Executive Officer, and
Caroline Zimm, Research Assistant, Transitions to New Technologies, IIASA**

Leave No SDG Behind

“Jointly implementing all the SDGs would contribute both to further human development and to safeguarding the commons and the stability of the Earth systems. Importantly, joint implementation that avoids silo-type thinking would be cheaper and faster than tackling them separately.”

A Radical Transformation of Key Economic Systems is Required

Despite the progress made, incremental steps will not suffice. The only hope lies in transformational—and permanent—change.

To stay within the planetary boundaries, a radical transformation of key economic systems will be required to significantly reduce their environmental footprint.

Four systems are of particular importance: the food system, the energy system, the urban system, and the global production/consumption system, where the current

“take-make-waste” model has nearly quadrupled global waste creation since 1970. A transformation of these four economic systems can change the course of the planet, and safeguard the health of the global commons.

The necessity of making our societies and economies more sustainable and less inequitable is not just to avoid disaster, but to build lasting prosperity. Operating within planetary boundaries is not just the only way to ensure healthy economies, but has the potential to provide much greater and better-shared growth. **That’s the opportunity of the commons.**

Andrew Steer, President and CEO, World Resources Institute

Taming Bigfoot

“Four revolutionary shifts in social and economic life are needed to tame Bigfoot-style economic impacts and safeguard the global commons: transforming cities, re-thinking food and agriculture, decarbonizing energy systems, and transitioning from linear approaches to production, design, use and disposal of materials to circular economic models.”

Inger Andersen, Director General, IUCN

The Natural Way Forward

“Despite such tremendous forces of transformation as climate change and dramatic socioeconomic inequality, there are credible and accessible political, economic, cultural and technological choices that can promote general welfare in ways that support and even enhance our planet’s natural assets.”



The Food System

The world will require about 70% increase in food production to meet dietary demands from a world population of nine to ten billion by 2050. Producing sustainable food while dealing with land use and degradation will be essential. A concentrated focus on global commodities with a significant deforestation footprint, on food security goals in areas of rapid agriculture expansion, restoration of fisheries, and to a certain extent, expanded efforts on land restoration, will contribute significant environmental gains while reversing the negative effects of land and coastal habitat degradation.



The Energy System

Decarbonization of the global energy system is of critical importance for a 1.5–2 °C future global temperature increase, in line with the Paris Agreement. The energy system represents 68 percent of global GHG emissions, and despite recent improvements only 23 percent of energy is provided by renewables today; and 1 billion people still lack access to electricity. By 2040 energy demand is projected to increase by 30 percent. In the face of these trends, deployment of renewable energy needs to accelerate sharply, as do energy efficiency improvements, all while increased energy demand—including from what is needed to close the electricity gap, especially in Sub-Saharan Africa and South Asia—is being met.



The Urban System

In the next 15 years, 70% of new infrastructure to be built will take place in urban areas. Currently, cities emit more than 70% of global GHGs and are also particularly vulnerable to climate change (rising sea levels, storms, floods, heat waves). Low-carbon and resilient infrastructure could make a significant contribution to the global reduction of GHG emissions while enhancing urban development. Such investments could generate annual GHG savings of 3.7 Gt by 2030; a significant share (perhaps 15%- to 20%) of the overall contributions to the Paris Agreement. Also, low carbon infrastructure—particularly in the buildings efficiency, public transportation and waste management sectors—could save cities an estimated US\$17 trillion globally by 2050.



The Production/ Consumption System

Today's economies are dominated by linear approaches to the way products are manufactured, used and disposed of, which means we extract natural resources, process them into products and packaging, and sell the products to consumers who ultimately dispose of them in the trash. In the last four decades, global materials use has tripled, from 23.7 billion tonnes in 1970 to 70.1 billion tonnes in 2010. What results from our linear “take-make-waste” industrial production and consumption systems is immensely unsustainable material resource use and productivity waste that are leading to widespread degradation and accumulation of waste and toxic materials in the environment.

Building a Movement for the Global Commons

In October 2016, over 200 leading environment, development and system design thinkers met in Washington, DC to discuss how mobilization of leadership, technology, science, innovation and communication can help bring about the transformation in economic systems that the planet needs.

The participants came together around a “shared purpose” included in a summary of key “principles” (see page 10).

The Dialogue was convened by the Global Environment Facility (GEF) and the International Union for the Conservation of Nature (IUCN), in partnership with the International Institute for Applied Systems Analysis (IIASA), the Stockholm Resilience Centre (SRC), the World Resources Institute (WRI) and the World Economic Forum (WEF) Environmental Systems Initiative.

This booklet includes quotes from each of the partners and other participants. They are taken from a series of articles in the online Guardian newspaper, where senior figures are exploring the state of the commons and how to address it.

The articles, and other contributions from well-known leaders in the sustainable development community, are featured in a special “GEF Partner Zone” as part of the paper’s Development 2030 Campaign. It can be found online at

<https://www.theguardian.com/the-gef-partner-zone>

The October dialogue and online series is just the beginning of what promises to be a vigorous, authoritative—yet constructive debate about one of the defining issues of our time.

For more information

<http://www.thegef.org/events/our-global-commons-international-dialogue>

<http://globalcommons.earth/>



Naoko Ishii, CEO and Chairperson, GEF

Safeguarding the Global Commons is the Wisest Investment We Can Make

“ *Operating within the planetary boundaries is not just the only way to ensure healthy economies, but has the potential to provide much greater and better shared growth than sticking to business as usual. Safeguarding and enhancing the global commons is therefore the wisest investment we can possibly make.* ”

Mary Robinson, President, Mary Robinson Foundation—Climate Justice

Climate Change Isn't Fair

“ *We are custodians of our planet, a global commons that, by 2050, will be home to some 9 billion people. It is our duty to live in such a way that the precious, life sustaining environment which keeps us is passed to future generations in at least as healthy a state as we received it from those before us.* ”

Nicholas Stern, Chair, Grantham Research Institute on Climate Change and the Environment at London School of Economics and Political Science; President, British Academy
Naoko Ishii, CEO and Chairperson, GEF

Only Green Growth Can Bring Prosperity

“ *The agenda that preserves our global commons is also the only sustainable route to growth and poverty reduction. But action with real pace and scale is urgent: the window of opportunity is narrow. The decisions we make over the next 15 years will determine what kind of world we will have for the rest of the century.* ”

Erik Solheim, Executive Director, UN Environment

The Care Horizon

“ *The answer to the tragedy of the commons is the answer to how we bring it within this horizon. We are smart enough, and have resources aplenty to solve our problems. We need the will and motivation—personal and political—to do it. For that to happen, we need to make an appeal within the care horizon.* ”

Movement for the Global Commons Statement of Principles

Our Lessons from Science

Life on Earth as we know it depends on what all humans share: a stable climate, healthy oceans, and the species, ecosystems, biomes and processes that provide the stability and resilience of the planet.

This is the Global Commons. For the past 10,000 years, the Global Commons has served as the foundation for dramatic growth in agriculture, cities, economies and cultures—in short, for civilization to emerge.

The prospects for sustainable development rest squarely on the integrity of the Global Commons, which is now being compromised.

The message from science is clear: humans are pushing the global commons to the limits of their coping capacity. We are facing a tragedy of the commons on a profound, global scale that only we can overcome.

Our Shared Purpose

At this critical juncture for the survival of the diversity of life on earth and the systems upon which humanity depends, we are catalyzing a movement to defend, enhance and sustain our Global Commons through:

- protecting the diversity of life on earth;
- developing innovative solutions that reflect the interdependence of all systems, including food, urban, energy, production and consumption, freshwater and oceans;
- engaging broadly, from communities to corporations to cabinets.

Because never before have we understood our place in the Global Commons as we do now; never before have we had the tools, knowledge and creativity that we do now; and never before have we had the shared purpose and will to act that we have now.

And because never again, will we have the opportunity.

Our resolve to achieve systems-level change

While time is short and the risks immense, the goal of a diverse, stable and prosperous planet is still within reach if we act now with a boldness that matches the unprecedented scale of the challenge.

With the Sustainable Development Goals and the Paris Climate Agreement, the world's nations have provided momentum and direction that must be seized.

But incremental progress will not be enough. Only with disruptive, systems-level change can we hope to get on the right path. Our focus should be a complete overhaul of key economic systems and development pathways:

- Our food system must be dramatically reshaped in a way that enables it to meet a 60–70 percent increase in global calorie demand—from aquatic and land-based sources—by 2050 while at the same time dramatically shrinking its footprint on the global environment.
- The world's cities to a significant degree hold the keys to success for the global commons. The coming decades will see a sharp burst in cities' growth. This is a once-in-a-lifetime opportunity to create the compact, connected and coordinated cities that the future requires.
- Decarbonizing the world's energy systems is a *sine qua non*. Recent data suggesting that global energy-related GHG emissions have plateaued despite continued economic growth are welcome, but the underlying power demand is still on the rise, and we are still a long way away from a radical shift towards a carbon-free energy system.
- The move from a “take-make-waste” to a circular economy must be radically accelerated. Today's linear approach to production, consumption and disposal of products is highly resource inefficient.

For each, we must continue to develop a compelling story about needs and opportunities for the Global Commons and work with those who can amplify the message; we must help unleash and leverage technology, and we must build and support emerging coalitions for change both from the bottom-up and the top-down.

Our mutual and individual roles

Only a broad and truly diverse movement can solve the problem of the Global Commons. No individual, organization, business or nation can succeed on her own. We must all play our part to catalyze change and build the movement. Some are champions who delivers the message, engage, excite, and help build momentum. Others are drivers who brings the evidence forward and point toward scalable solutions. Enablers provide the financing, the policy frameworks, and the necessary technical support. And conveners create the platforms for dialogue, facilitates discussion, and bring in new actors.

Our bottom line for safeguarding the Global Commons is the following: It is urgent, it is needed for people and planet, and the world will be so much better for it—so let's get on with it!

We invite all to join and contribute.

Thought Leaders on the Global Commons

The following articles appear in the GEF-Guardian Partner Zone:

- **Inger Andersen, Director General, IUCN**
The Natural Way Forward
- **Peter Bakker, President, World Business Council for Sustainable Development**
A Wealth of Opportunities
- **Sharan Burrow, General Secretary, International Trade Union Confederation**
Sustainability Must Create Good Jobs
- **Kathy Calvin, President and CEO, UN Foundation**
Making Change Decisive
- **Juan Carlos Castilla-Rubio, Chairman, Space Time Ventures and Carlos Nobre, Member, UN Scientific Advisory Board for Global Sustainability**
The Amazon's New Industrial Revolution
- **Daniel C. Esty, Hillhouse Professor of Environmental Law and Policy, Yale University; Co-author Green to Gold**
Climate Action Needs Green, Not Just Red Lights
- **Christiana Figueres, Former Executive Secretary of the UNFCCC, Convener, Mission 2020**
Why 2020 is a Critical Milestone On Our Journey to a Climate-Safe World
- **Rupert Howes, CEO, The Marine Stewardship Council**
Labelling Seafood Can Help End Overfishing in 30 Months
- **Naoko Ishii, CEO and Chairperson, GEF**
Safeguarding the Global Commons is the Wisest Investment We Can Make
- **Mary Ellen Iskenderian, President and CEO, Women's World Banking**
Give Women Credit and Meet the Global Goals
- **Jeremy Jackson, Senior Scientist Emeritus, Smithsonian Institution, Professor Emeritus, Scripps Institution of Oceanography**
We Only Have 20 Years to Save the Oceans
- **Yolanda Kakabadse, President, WWF International**
Turning the Tide on Ocean Degradation
- **Homi Kharas, Deputy Director, Global Economy and Development Programme, Brookings Institute**
Middle Class Prosperity Can Save the Planet
- **Thomas Lovejoy, Professor of Environmental Science and Policy, George Mason University**
Crossing the Living Boundary
- **Mark Malloch-Brown, Chair of the Business and Sustainable Development Commission**
Transforming Globalisation
- **Nebojsa Nakicenovic, Deputy Director General/Deputy Chief Executive Officer, and Caroline Zimm, Research Assistant, Transitions to New Technologies, IIASA**
Leave No SDG Behind
- **Jeremy Oppenheim, Programme Director, Business and Sustainable Development Commission**
Prosperity that Preserves the Planet
- **Rolph Payet, Executive Secretary, Basel, Rotterdam, and Stockholm Conventions**
Waste Not, Want Not
- **Kate Raworth, Author, Doughnut Economics**
How to Tell If a Company Really Protects the Global Commons
- **N.H. Ravindranath, Professor, Indian Institute of Science, Bangalore**
Losing Ground in a Warmer World
- **Mary Robinson, President, Mary Robinson Foundation—Climate Justice**
Climate Change Isn't Fair
- **Johan Rockström, Executive Director, Stockholm Resilience Centre**
Goodbye Forever, Friendly Holocene
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Taming Bigfoot
- **Nicholas Stern, Chair, Grantham Research Institute on Climate Change and the Environment at LSE, and President, British Academy, and Naoko Ishii, CEO, GEF**
Only Green Growth Can Bring Prosperity
- **Pavan Sukhdev, Founder, GIST Advisory**
Embracing the SDGs' Complexity
- **Nigel Topping, CEO, We Mean Business**
Just Managing
- **Keith Tuffley, Managing Partner and CEO, the B Team**
Business is on Thin Ice—As I Found in an Antarctic Crevasse
- **Dominic Waughray, Head of Public-Private Partnership, Member of the Executive Committee, WEF**
Three Wicked Problems of the Commons
- **Park Won-soon, Mayor of Seoul and President of ICLEI Local Governments for Sustainability**
Achieving the Urban Dream
- **Elizabeth Yee, Vice-President, City Solutions, 100 Resilient Cities**
Cities Must Embrace Nature to Survive



Goodbye forever, friendly Holocene

JOHAN ROCKSTRÖM

Executive Director of the Stockholm Resilience Centre

Earth has left the geological epoch that we know and love. Now our political and economic systems must change fast to deal with the Anthropocene

Geologists rarely make headlines. But this month the word ‘Anthropocene’ flooded the media following an intervention by scientists at the International Geological Congress in Cape Town. Since 2009, they have been poring over the evidence to work out whether the Earth has slipped abruptly and unexpectedly into a new geological epoch.

They reached a startling conclusion: Earth has left the cosy confines of the epoch we humans know, love and absolutely depend upon—the Holocene.

This was as profound an observation as two of science’s most significant discoveries—Copernican heliocentricity and or Darwin’s evolution. Like them, the coming of the Anthropocene demands we rethink our world view. No longer are we a small world on a big planet; we leave a giant footprint. When future historians look back at the 20th century, the most significant event will not be the world wars, the Cold War, the Great Depression or the end of apartheid—as important as these are. Instead, it will be the great acceleration of the human enterprise that drove Earth into a new state.

The Holocene has been good for us. It began 11,700 years ago as Earth slipped from the grip of a deep ice age—as it has, like clockwork, every 100,000 years. Since then, the average temperature of the planet has fluctuated no more than one degree Celsius or so.

Without this remarkable stability, which provides us with reliable growing and rainy seasons, we would not have developed agriculture. It is the reason why we have complex societies. It is the foundation for our cities and science, art and culture. It is how we can feed seven billion people, cure diseases and land on the moon.

Unfortunately, this stability can no longer be relied upon. Records keep getting smashed. August was the warmest month globally since modern records began 136 years ago. September is the tenth straight month of record temperatures. According to NASA, it is now “almost a certainty” that 2016 will go down in history as the warmest year on record, beating the warmest so far, 2015. Alarm bells are ringing in the Earth research community.

But are they ringing elsewhere? Up to this month, all has been worryingly quiet as nations deal with more immediate calamities. Almost one year after the launch of the Sustainable Development Goals and nine months after the Paris Agreement on climate change, short-term political agendas seem to have trumped planetary stability. It is worth recalling the September 2015 speech by Mark Carney, governor of the Bank of England, in which he argued that once climate change becomes a defining issue for financial stability, it may be too late.

This is perhaps the greatest paradox of the world we now live in. We have a frontiers mentality. The vastness of Earth’s atmosphere, oceans, ice sheets and rainforests seem to continue forever over an endless horizon. This was certainly true throughout the 200,000 years since humans first walked the African savanna. It was true even 40 years ago. But it is not true now. The exponential growth of industrial societies since the 1950s means that Earth has reached saturation point.

Last year, my colleagues and I published a detailed assessment of the state of the planet. We confirmed that Earth’s resilience is dependent upon nine planetary boundaries relating to climate, deforestation, biodiversity, ocean acidification, chemical pollution, ozone, water, fertiliser use and aerosols. We also estimated that human activity has driven Earth across four such boundaries, particularly relating to greenhouse gas emissions and the devastating loss of species which may place us at the start of a sixth mass extinction on Earth.

This generation is facing a “tragedy of the commons” on a profound scale. We are simply not geared up to deal with this. Our

institutions—such as the United Nations, the banking system, and nation states—were designed for the Holocene, not the Anthropocene. Economics assume a forgiving planet with infinite resilience, the capacity to buffer such abuse as the injection of 40bn tonnes of CO₂ each year.

Up until 1990 Earth could withstand our pressures. But since then it has started to send invoices back to society in the form of heatwaves, droughts, accelerated ice melt and sea level rise, and collapsing lakes and fish stocks. And we have not recognised how a nation’s security and economy depends on a stable Earth. Our notion of global commons focuses on user rights over “resources” such as Antarctica, outer space, the high seas and the atmosphere. In practice, the ice sheets, oceans, waterways and rainforests—essential for the stability of the whole planet—are priced in the same way as luxury goods: their value in the distant future calculated as negligible.

It is time to re-evaluate our economic and political models for the Anthropocene. The starting point must be our very notion of the global commons. Any attempt to stabilise global temperatures, for example, implies a finite carbon budget—the amount of greenhouse gas emissions—that we must not exceed. At current rates we will use up this budget in the next 10 to 20 years (as far as science can tell). Earth can only tolerate only 400 to 800bn tonnes of CO₂ without tipping over the two degrees Celsius planetary limit. This is humanity’s budget for our remaining time on Earth. And you do not negotiate with Earth.

The global carbon cycle, whether within or beyond national jurisdiction, is a global common. The same applies to rainforests, freshwater, the ozone layer, biodiversity. Our thoughtless assumption that we can take all this for granted is humanity’s biggest gamble, as myself and colleagues argued recently and in the Earth Statement last year.

Industrial societies now wield astonishing power. Earth’s future is in the balance and we must handle it with care and respect. We need new institutions to catalyse the transformation of societies. The new global goals and the Paris Agreement on climate are the first signs of a new approach to the global commons. The US and China’s ratification of the Paris Agreement has sent a powerful signal to all nations that is impossible to ignore. We now need this signal to spark rapid, deep, systemic change across all societies.



Taming Bigfoot

ANDREW STEER

President and CEO of World Resources Institute

***Ways to shrink our environmental footprint
so as to safeguard the global commons***

Welcome to the Anthropocene, an era built on centuries of economic growth. In the 50 years before this new age, the human economic footprint grew faster in terms of GDP than at any time in recorded history. By the year 2100, it could grow to Bigfoot proportions, possibly 1,000 times the size it was in 1900.

This rapid growth has been a sign of markets working, leading to broader prosperity and falling real commodity prices despite a 25-fold increase in demand. Poverty levels dropped, demand in emerging markets skyrocketed and the global middle class is likely to double or even triple by 2030.

These economic advances have been built on a key characteristic of the old geologic era, the Holocene: stability. For 10,000 years, patterns of temperature, precipitation and seasonality stayed essentially the same, with global temperatures varying less than a degree. This “Goldilocks” pattern—not too hot or cold—encouraged society to grow. But we have taken the stability of our global environmental systems for granted —just as we have the global environmental commons that sustain them.

Economic growth has reached a scale that puts the global commons under immense pressure from such threats as climate change, pollution, extinction, habitat loss, overuse and over-extraction. Unlike in functioning economic markets, no clear market signals or rules and regulations exist to manage the global environmental commons. And current traditional approaches to securing them have fallen far too short.

The resulting Bigfoot-size impact of cumulative human economic and industrial activities severely strains the commons. So what can be done when doing more of the same is clearly not enough?

Four revolutionary shifts in social and economic life are needed to tame Bigfoot-style economic impacts and safeguard the global commons.

First, as the global population shifts quickly from rural to urban, transforming the world's cities from congested, disorganised and sprawling to compact, connected and coordinated ones are critical. The magnitude of the shift can be mind-boggling: in 1900, only 3% of people lived in cities; now 55% do. Urban population is expected to grow by 700 million each decade until 2060, while 3 billion people are expected to join the global middle class, almost all of them in urban areas.

Congestion and sprawl are expensive. In the United States alone, urban sprawl costs an estimated \$1 trillion annually. In many emerging economies, the spread of cities pushes infrastructure to the breaking point, making for longer commutes and the use of scarce resources to build roads, which worsens quality of life and the environment.

Designing cities for people instead of cars can shrink environmental pressures and make businesses more productive, saving \$3 trillion in urban infrastructure investment worldwide over the next 15 years.

Second, we need to re-think food and agriculture. Food production already takes up 37% of the world's landmass (excluding Antarctica), and accounts for 70% of global freshwater withdrawals and 24% of the world's greenhouse gas emissions. Even as population and appetite grow, agriculture is exhausting cropland, with 10m hectares abandoned each year due to soil degradation.

By 2050, we will need 60–70% more food calories for an estimated 9.7 billion people, many of them with middle-class tastes for resource-intensive products like beef and dairy. We must make cropland, livestock and aquaculture more productive while minimising food loss and waste and shifting diets to less resource costly foods.

Third, decarbonising energy systems can help us decouple global greenhouse gas emissions and economic growth. Global energy use has increased roughly 13-fold since 1900. To create energy access for all, energy use will probably need to increase by another 50% by 2040. Under current patterns this will create a 34% rise in energy-related

carbon dioxide emissions when they actually need to be falling by at least the same amount.

The good news is 70% of the energy infrastructure needed to meet this growing demand has yet to be built, providing immense opportunity for investment in energy efficiency and clean energy sources.

Fourth, we need to transition from linear approaches to production, design, use and disposal of materials to circular economic models that can make us more resource productive and efficient across the economy.

We must minimise waste by keeping resources and products—and their value—circulating in the economy as long as possible. This means discovering how to loop our production, consumption and waste management processes, improve designs and make use of waste outputs from one system as inputs for others.

Revolutions aren't easy, but they are possible. However, the shifts we need—in policies, behaviours and business—to “tip” our economic and social systems worldwide are not happening at the speed and scale required.

We must identify potential paths of influence that can catalyse revolutionary changes and learn from examples of positive tipping points. And we must develop strategies to bring them together with the disruptive power of information technology and multi-stakeholder cooperation that are already driving profound, far-reaching convulsions in our wider models of government, business and society.

A diverse group of first movers from business, international organisations, think tanks and civil society met in Washington DC this month to do just that. The dialogue on the global commons—led by the Global Environment Facility and the International Union for the Conservation of Nature, with World Resources Institute's full and active support—proved to be an exciting first step towards agreeing on such strategies.

The task ahead is immense. But existing tipping points—like the radical improvement of economic policies in 100 countries between 1985 and 2000 or the spread of bike sharing from zero to 850 cities in less than 10 years—along with technological advancements and emerging practices offer unprecedented hope for the economic and environmental action we need.

Safeguarding the global commons is the wisest investment we can make

NAOKO ISHII

CEO and Chairperson of the Global Environment Facility

We are at a defining moment for the future of our planet and its people

Scientists tell us that the biophysical processes that determine the stability and resilience of earth, our “planetary boundaries” that allowed our societies to thrive during the past 10,000 years, are being pushed to their limit. Evidence is mounting that the miraculously, favourable earth conditions that scientist call the Holocene—the only ones we know can support a human population of 7.4 billion and more—risk coming to an end.

The greenhouse gases that cause climate change are at higher levels than at any time in at least 800,000 years; 2015 was the hottest year on record, and 2016 may be hotter still. Globally, species are being lost at a rate only seen before during mass extinctions. The health of our oceans is declining rapidly.

The alarm bells are ringing. On the current trajectory, the worsening global environment will be an ever-increasing threat to our global aspirations for economic growth, jobs, security and prosperity. There is an enormous amount of work to be done, and success remains far from certain, but now is the time to tackle the world’s most pressing environmental and social problems

Our fate is in our own hands. As the world moves out of the Holocene into what is being gradually recognised as a new Anthropocene epoch—an epoch where humans are the largest driving force of change on planet Earth—it is our common responsibility to change our ways of operating to ensure that this vital system continues as our essential global commons.

The world’s governments took the first steps in that direction last year. In September, nearly 200 nations gathered in New York, pledged their commitment to 17 sustainable development goals (SDGs) to guide growth

over the next 15 years in ways designed to end poverty and ensure prosperity while respecting planetary boundaries. Three months later in Paris the same governments adopted an agreement to combat climate change, committing to achieving zero net emissions of greenhouse gases in the second half of the century.

Shifting to a low carbon and resilient trajectory will require coordinated, integrated solutions to catalyse the transformation of three key economic systems: energy—how we power our homes, offices and industry, and move goods and people; urban—how we live in cities and build new ones; and land use—how and where we produce food, and what we eat.

As an institution dedicated to ensuring the health of the global environmental commons, we at the Global Environment Facility recognise that while we have won some battles the war to maintain the conditions for future prosperity and well-being is still being lost. There have been many good individual actions, but they have not added up to the systemic changes that are needed.

Transformational change will require actions on multiple fronts and at all levels of society. It will require political and social mobilisation and bold leadership.

It is our hope that this new effort will lay the foundation for a new paradigm for the global commons. We need a new way of thinking that enables transformational change, new alliances, social and economic opportunities, and provides the stable conditions necessary for sustainable growth, poverty reduction, peace and security.

It will be a journey not just to avoid disaster, but to build lasting prosperity. Operating within the planetary boundaries is not just the only way to ensure healthy economies, but has the potential to provide much greater and better shared growth than sticking to business as usual. Safeguarding and enhancing the global commons is therefore the wisest investment we can possibly make.

The image features five wind turbines in silhouette against a dramatic, cloudy sky at sunset or sunrise. The sky is filled with warm, golden-yellow and orange light, with darker clouds catching the low sun. The turbines are of varying heights and are positioned across the frame, with one particularly large one on the right side. The overall mood is one of hope and sustainable energy.

“Our fate is in our own hands.”



The natural way forward

INGER ANDERSEN
Director General, IUCN

We must work collectively to secure the support systems that nature provides

Two competing narratives frame the debate of the future of the global commons, of the earth's operating system, on which all life depends. One pessimistically claims that it is already too late to avoid catastrophe and that we must therefore now focus on survival and recovery. The other is a stubborn optimism, which argues that humanity has faced and overcome many great challenges in the past and will continue to do so. The first leaves people in despair, the second risks indifference and denial.

There is, however, an emerging viable alternative—one that embraces the reality that we live in a world of complex, interdependent systems and acknowledges that changes to them can either enhance resilience or result in greater instability and uncertainty. It stresses that nature conservation and human progress are not mutually exclusive. Despite such tremendous forces of transformation as climate change and dramatic socioeconomic inequality, there are credible and accessible political, economic, cultural and technological choices that can promote general welfare in ways that support and even enhance our planet's natural assets.

This alternative future has long been given expression by the international community through such declarations as The World Charter for Nature, Agenda 21, The Earth Charter, and the UN General Assembly resolutions on harmony with nature, which point to the need for profound transformations in our patterns of production and consumption, and recognise that every form of life has value regardless of its worth to human beings.

Now it has climaxed in the world's commitment to deliver the ambitious sustainable development goals, within a 15 year timeframe. There is a real sense of urgency in this call to action, since we live in a time of tremendous change when the imperative of meeting immediate human needs clashes with its long-term impact on the planet's capacity to support life. Many believe that current trends are not sustainable and that there is a closing window of opportunity to effect meaningful change in humanity's trajectory. Time is running out to find ways of making progress that both safeguard and reinforce the natural world that sustains us. Our future will be decided by the choices we make now.

Certainly there are grounds for concern. We are now some 7.3 billion people on Earth and the UN estimates that, under a medium growth scenario, we will be more than 8.5 billion by 2030. Over half the world's population is already living in urban areas, increasingly disconnected from the complex systems of nature and biodiversity that keep us all alive.

Shifting patterns of global wealth and economic growth over the past 15 years have led to important increases in economic wellbeing, lifting hundreds of millions of people from poverty, and improving other such important indicators as maternal health. But other problems persist or grow steadily worse. The benefits of development are not shared equitably, the gap between rich and poor is widening, and economic growth is occurring at the expense of ecological integrity. Scientists have reported that the "planetary boundaries" to the biophysical processes on which the earth depends are being pushed to the limit:

some, such as the climate and the integrity of the biosphere, have already been exceeded.

We can expect more of this to happen over the next 15 years, in ways that simultaneously bring hope yet further strain the planet's biodiversity and its capacity to support human needs and expectations. Yet a steady increase in global wellbeing can only be achieved through an enhanced understanding of the planet's complex life support systems and the predominant global trends that act upon them—urbanisation, economic growth, burgeoning consumption, disappearing biodiversity, wealth inequality, climate change, population growth, and so on. Nature will most likely go on, whatever happens, so the relevant questions are: to what extent will healthy, prosperous and secure societies continue to be a part of the story, and how much of the greater community of life will persist?

IUCN—which holds its World Conservation Congress in Hawaii in the first 10 days of September—has been aligning conservation efforts all over the world around three solid lines of work: valuing and conserving nature's diversity; advancing effective and equitable governance of its use; and deploying nature-based solutions to climate, food and development challenges. The approach emerging from our collective efforts demonstrates that nature is not an obstacle to human aspirations, but an essential partner, offering valuable contributions towards all our endeavours.

For the alternative path to be credible and viable, we need new partnerships across the planet, between governments, NGOs, conservationists, scientists, consumers, producers, urban planners, entrepreneurs, grassroots and indigenous organisations and financial backers. Each partner holds a vital piece of the puzzle, in knowledge, tools and resources. We need to bring these pieces together, and collectively complete the greatest puzzle ever attempted, to secure nature's support systems so that humanity and the greater community of life may continue to prosper on earth. This is our collective challenge for the next 15 years.

***Our future will be decided
by the choices we make now.***



Leave no SDG behind

NEBOJSA NAKICENOVIC

Deputy Director General and Deputy CEO of the International Institute for Applied Systems Analysis (IIASA)

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Science has an important role in supporting new global social contract and the 2030 agenda

2015

marked a historic turning point. The Sustainable Development Goals (SDGs) unanimously adopted by the United Nations last September provide an aspirational narrative and specific targets for human development: a world free from hunger, injustice and absolute poverty; a world with universal education, health and employment; a world with inclusive economic growth, based on transparency, dignity and equity.

The 17 SDGs' call for "global citizenship and shared responsibility" and provide legitimacy for a new global social contract for a grand transformation toward a sustainable future. They fully acknowledge the scientific advances achieved during the last three decades that have established compelling evidence that otherwise, as the UN general assembly warned, "the survival of many societies, and of the biological support systems of the planet, is at risk." Humanity has pushed the Earth system and its global commons to their limits and the SDGs provide us with the long-needed paradigm shift towards realising the opportunity of a sustainable future for all.

The climate agreement adopted in Paris last December has further strengthened understanding that our society depends on sustainable

stewardship of the global commons, shared by us all—and particularly on the stability of the climate system. The Earth system can no longer be viewed as an economic or social externality. Last year we moved beyond the traditional view of global commons as merely the common heritage of humankind outside national jurisdiction. Now we must move beyond national sovereignty to deal with the Earth system and human systems holistically, as the SDGs require. The Paris agreement is a huge step in the right direction.

Time is running out, so we must take urgent action to implement the UN 2030 agenda. Just 14 years are left—less than the wink of an eye in the history of human development, or of the Holocene’s stable Earth systems. But where to start? Which of the 17 goals, which of the 169 targets should be tackled first? Policy makers, the media, civil society and scientists all ask these questions.

However, the 2030 agenda stresses that the SDGs are indivisible and integrated—and cumulative, since efforts to achieve them must be sustained well into the second half of the century, especially in preserving the regulating function of the global commons. Some of the goals, such as SDG13 on climate, must operate on a time scale longer than century.

Moreover, there are interactions between and among the SDGs. For example, achieving SDG7, the energy goal, could jeopardise SDGs related to water, health and climate. Tackled in harmony, however, these goals can support one another: there would, for example, be clear health benefits from reducing indoor and outdoor air pollution through global decarbonisation. Jointly implementing all the SDGs would contribute both to further human development and to safeguarding the commons and the stability of the Earth systems. Importantly, joint implementation that avoids silo-type thinking would be cheaper and faster than tackling them separately.

All these goals should be achieved in such a way as to maximise synergies and minimise investment costs and trade-offs. The SDG credo “leave no one behind” also applies to the SDGs themselves. They are indivisible. We have to deliver on all of them if we want to succeed.

The SDGs are very ambitious but it appears that tackling them together will help humanity make rapid progress and enter a new era for human societies and the Earth system. Yet, many interactions—and their scope—are unknown, and this hampers holistic policy making. We lack clear understanding of the benefits of achieving SDGs and of costs of inaction, especially when it comes to regional and national differences. We urgently need this fact-based information.

We have a plethora of knowledge, but need new ways to synthesise, integrate and share it so as to use its full potential in support of the SDGs and the global commons. Science—one of the strongest voices of the environment in governance—must become more active and leave its ivory tower to engage more intensely with other stakeholders.

This is why we at IIASA, together with the Stockholm Resilience Center, and the Sustainable Development Solutions Network have launched the scientific initiative The World in 2050 (TWI2050), designed to provide the scientific knowledge to support the policy process and implementation of the 2030 agenda.

TWI2050 aims to address the full spectrum of transformational challenges in fulfilling the SDGs in an integrated way so as to avoid potential conflicts among them and reap the benefits of potential synergies through achieving them in unison. This requires a systemic approach.

The time for “climate-only” or “economic development-only” approaches is over. We urgently need an integrated understanding of the processes that account for the inter-linkages between the economy, demography, technology, environment, climate, human development, all global commons and planetary boundaries. TWI2050 brings together leading policymakers, analysts, and modelling and analytical teams to collaborate in developing pathways towards the sustainable futures and policy frameworks necessary for achieving the needed transformational change.

Such a grand transformation goes beyond a purely technology-centred view of the world or the substitution of one technology by another. It encompasses social and behavioural changes at all levels, as well as technological ones. Incremental changes, now being experienced in some areas, are useful but will not suffice: we have waited too long and the window for action is closing rapidly in some domains including such global commons as climate. We will need radical changes in human behaviour and technological paradigms. TWI2050 will look beyond 2030 to 2050—and, in some cases, even to 2100—to draw a vision of the world where the SDGs are eventually fulfilled.

The SDGs and the Paris agreement show what institutional international governance can achieve with joined forces. We have entered a new era of global governance, acknowledging the complexity and the connectivity of human development with the global commons and the Earth system. TWI2050 hopes to serve the global community with the best science available in tackling these key global challenges for humankind.



Three wicked problems of the commons

DOMINIC WAUGHRAV

*Head of Public Private Cooperation at the World Economic Forum;
Visiting Scholar at Stanford University Woods Institute for
the Environment*

***We urgently need to manage the
interrelated challenges of energy, water
and agriculture in a changing climate***

Global energy consumption is forecast to increase by nearly 50% by 2040 according to the International Energy Agency (IEA) 2016 Global Energy Forecast, with energy-related CO₂ emissions rising by 34% from 2012 levels. Emerging economies like China and India will drive most of this, as they continue to rely heavily on fossil fuels to meet demands from their expanding industry and cities. India will need to quadruple its present installed capacity of about 270GW by then, creating another United States in terms of energy use.

On top of this there is, of course, the urgent need for more energy access for rural and poorer people. At present more than three billion people in developing countries still rely on traditional “biomass” for heating and cooking: 1.5 billion lack access to electricity. India alone has 240 million, mostly rural, people without such access and rightly seeks to move them out of energy poverty as quickly as possible. It submitted a bold target of achieving a 40% share of non-fossil fuels in its energy mix by 2030 to last year’s climate negotiations in Paris. But it also plans to expand its coal capacity to 400GW of coal fired electricity, over 40% of the mix, by 2035. Its greenhouse gas

emissions will grow rapidly to around 5 gigatonnes by 2030, about as big as those of the United States today.

So here is wicked problem number one in protecting our global commons: how do we get millions of people out of energy poverty without significantly increasing greenhouse gas emissions?

Electricity production can also be surprisingly thirsty. A megawatt hour of electricity generated from sub-critical coal-fired power stations can require up to 2,000 litres of water. The US Geological Survey estimates that to produce and burn the around 900m tons of coal the United States uses each year to provide about 34% its electricity, requires between 55-75tn gallons of water annually; about equal to the amount that pours over Niagara Falls in five months!

India, the IEA estimates, will need up to 60bn cubic metres of water a year for its coal-fired electricity plans by 2035. Its expansion of coal will push the water requirements of its industry and energy sectors up from 2-8% as a share of overall withdrawals.

This extra water equates to about 37m³—more than an oil-tanker truckload—for every person in India just to meet India's coal fired electricity plans by 2035 (assuming its population is then about 1.6 billion). Or, to put it another way, it would mean accessing some 12% of the Ganges average historic annual flow of 500bn metres cubed of water, including in non-monsoon seasons when energy is still needed but rivers are low.

As emerging economies urbanise and industrialise, using fossil fuel power, more of their water will need to be allocated to energy. Modelling by the Colombia University Water Group for the World Economic Forum suggests a 76% increase in water demand for energy and industry will be required across Asia by 2030. And 70% of the continent's river and groundwater is on average already being used for agriculture.

So here is wicked problem number two in protecting our global commons: how can the competing needs of water for agriculture and fossil-fuel energy be squared off? Without radical changes in agricultural or energy production, it is not clear how well the future water needs for India's coal sector will go down with the country's farmers.

And here's the third wicked problem: India's coal fired power stations will have to be built somewhere.

More than 70% of India's power plants are located in areas that are already water stressed or water scarce, and most of the new coal-fired ones will be required where it is scarcest. The country's warm temperatures and the poor quality coal used in most of its power plants will increase their cooling water requirements. The high levels of pollution in rivers and waterways won't help either; nor will the seasonality of river flow. Power plant costs can rise 40-400% as you try to improve water use efficiency, without much benefit in wider efficiency ratios, as Eskom in South Africa has experienced—making coal no longer cheap.

Yet without water there can be no coal fired electricity production, making energy security a problem. In March, the flagship 2,300MW coal plant at Farakka town in West Bengal had to suspend its generation due to low water in the canal that feeds it. India's 91 reservoirs are at an average 29% of storage capacity according to the Central Water Commission. Historic levels of over-abstraction combined with forecast climate change will add extra stress on future water availability, making an already wicked problem super wicked.

These interrelated challenges of energy, agriculture, water and climate change are what we would call a "systems" challenge. The United States and India are by no means alone in facing it. Who is working with the power sector to place their investment programmes into the context of basin wide hydrological risk maps assessing who will need what water (including for the environment)? Answer: no one. Who is agreeing on adjustments to the cost benefit analysis of investment appraisals to take proper account of these risks? Answer: no one. Who is overlaying these investment analyses with different climate scenarios for water scarcity? Answer: again, no one.

Someone will have to do all this, and soon, or these wicked problems will come home to roost, and we will never properly address the competing challenges of managing our global commons and ensuring needed economic development. Then, as ever, it is likely to be the poorest people who will lose out.



A wealth of opportunities

PETER BAKKER

President of the World Business Council for Sustainable Development

Transformative change to safeguard the global commons could mobilise investment

For decades, the “tragedy of the commons” has been a useful tool for understanding and explaining the risks of undervaluing shared resources. Today such issues—those of the “global commons”—touch upon almost every aspect of our daily lives.

What was once a hypothetical theory is now a global reality—and it’s our responsibility to do whatever we can to address it.

Business is in a unique position to observe and intervene in many issues facing the global commons—from reducing emissions and addressing climate change, to stopping ocean pollution and fixing broken food systems. Across the world, companies are stepping up to meet the challenge.

At the World Business Council for Sustainable Development (WBCSD) over 200 of the world’s biggest companies are focused on addressing global commons issues through two key pillars: catalysing systemic change across key economy sectors and changing the rules of the game to ensure that businesses are measured by their true cost, true profits and true value.

The adoption of the Sustainable Development Goals (SDGs) and the Paris Agreement sent a powerful signal that the world is ready to change—that businesses who don’t adapt and who don’t respect the global commons will be left behind as more sustainable businesses become more successful. This new framework represents an

unprecedented wealth of opportunities that are good for business, society and the environment.

The Business and Sustainable Development Commission (BSDC) is working to quantify these opportunities—because getting any CEO on board will require translating sustainability jargon into a language he or she will understand.

The data the BSDC is uncovering is compelling, especially from a business standpoint. Preliminary research suggests that the new global development framework (ie opportunities associated with addressing global commons issues through the SDGs) could channel significant financial investment into the global economy. To seize these opportunities, we must move beyond incremental change.

It does not make sense for business to address each SDG one by one. Instead, it is calling for complete systems transformation across global economic sectors to address many SDGs at once.

By implementing business solutions across energy systems, food and land use systems and cities and mobility systems, WBCSD member companies are bringing their skills and expertise to scale up solutions in the widest, most positive way possible.

Representatives from business, government, academia and civil society must come together to truly transform the entire economic system. Redefining the way we value business and society, must be a key element of that.

We know that addressing global commons issues and meeting the SDGs is the right thing to do. We must now ensure that it also becomes the easiest and clearest choice for business. In other words, we need to re-evaluate the way we measure success.

Focusing solely on financial performance has, for too long, allowed companies to neglect important aspects of material risk management and disclosure, reinforcing business patterns that degrade the global commons.

All of this is about to change. Companies are beginning to see that it's critical to consider additional performance metrics in order to set appropriate goals, understand progress and share accurate and relevant information. The revolutionary Natural and Social Capital Protocols aim at creating a new framework for companies to understand and measure their impacts and dependencies on nature and society.

In July 2016, the world took a giant step towards natural capital accounting by officially launching the Natural Capital Protocol—opening a new pathway for companies.

By thinking strategically about natural capital decisions and implementing the Protocol, forward thinking companies now have the opportunity to impact sustainability while reducing the market distortions that allow for damage to the global commons to occur in the first place.

The combination of systems transformation at the industry and business level, and economic restructuring on the financial and reporting level, will push the world in the right direction. But we need to abandon incrementalism in favour of complete transformation.

Each and every one of us—business included—depends on common global resources and we all have an important role to play in leading the change.

Business must continue to step up, and the collective global community must also come together to move forward. We have cleared the first hurdle in agreeing on a sustainable pathway forward, but now it's time to work together to implement meaningful and lasting change.

“This is only the beginning.”



Achieving the urban dream

PARK WON-SOON

Mayor of Seoul and president of ICLEI Local Governments for Sustainability

Ways to shrink our environmental footprint so as to safeguard the global commons

Cities have been playing a pivotal role in global development since industrialization. They have grown intensively and become the center for politics, administration, culture and industrialization. They are truly symbols of advanced civilization, where innovation and opportunity are booming.

And they continue to grow. According to the UN-Habitat report, the global urban population is expected to reach 5 billion—or 67% of the global population—and there will be at least 40 megacities with more than 10 million residents by 2030. This sort of growth also means that cities have an important role to play in protecting our global commons including, among many other actions, reducing our contribution to global greenhouse gas emissions.

Cities need to face their rapid expansion head-on with a clear vision for low-carbon, resilient—and overall sustainable—development that protects our shared natural resources.

Seoul, like most cities, is not free from the negative impacts of urban development. We have undergone rapid urbanization and fast economic growth, which in turn has created challenges to the good care of our environment and the management of the transport sector. Acting, with the engagement of our citizens, to overcome these challenges, we realised firsthand that cities have a crucial role to play in making sustainable development possible. After all, cities are home to most people in the world.



Crossing the living boundary

THOMAS LOVEJOY

Professor of environmental science and policy, George Mason University

Why degrading biodiversity is the greatest of all violations of the global commons

Humans are a curious species. We are remarkably adept at manipulating, even more so at communicating and thinking symbolically and analytically. The result is a multicultural fount of intellectual products - scientific, artistic, humanistic and more—all fostered by our innate social primate nature.

But there's also a dangerous underside—an almost narcissistic and myopic focus on ourselves. We tend to be absorbed by mutual grooming, in various forms, while ignoring self-created environmental chimeras even to the point of crossing planetary boundaries—exceeding the conditions, basically, which nurtured the rise of our civilisation.

The ways in which we are crossing these boundaries all have biological consequences. Almost by definition—even if this is not widely recognised—nothing is considered to be an environmental problem unless it affects living systems. By far the greatest violation is that of the biodiversity planetary boundary - because, in a sense, it is the sum of the impact of all the other boundary transgressions.

So it is not surprising that we are at the beginning of the sixth great extinction of life on earth. The difference from the previous extinction events is not only that a single species (our own) is causing it, but also that it is at least partly aware of what it is doing, and is capable of acting to stop the loss. Flushed with our apparent success, we are perilously close to losing a significant portion of the

global commons which, in many senses, made the success possible in the first place.

Biodiversity largely occurs within national jurisdictions on land and within coastal economic zones (even though enormous marine areas beyond national jurisdiction cover almost half the planet). So much of the early history of the Convention on Biological Diversity was focused on “who” benefits from the immediate value of a species that has been newly recognised to have human, and therefore economic, benefit. That is why national GEF biodiversity projects are viewed as having both national and global benefits.

It has been important to set up rules about how such benefits could be shared. But, if taken to exclusion, doing this overlooks how much of them are generated not so much by the actual plant or animal species in itself, but from what science learns about it. Biodiversity is, in fact, a kind of living library for the life sciences, since each species represents a set of solutions to a very specific set of biological problems.

The concept of antibiotics, responsible for the health of untold numbers of people, came from the chance airborne contamination of Fleming’s laboratory cultures by *Penicillium* mould. That could have happened anywhere, because the mould is so widespread, but most species are much more restricted biologically and geographically. The class of medicines known as ACE inhibitors, for example, stem from studies of the venom of a new world tropical pit viper. The result: the treatment of choice for hypertension worldwide.

The point is that a major portion of the potential of the planet’s biodiversity lies in the intellectual realm of what investigators might do with it. This is, therefore, as much part of the global commons as a

molecule of carbon-dioxide, released by burning a fossil fuel, which adds to the climate change burden of all countries.

Biodiversity provides vital goods and services, which—though produced locally by metabolic activity—have a global impact. These include: producing oxygen through photosynthesis; sequestering CO₂ through soil formation (simultaneously increasing soil fertility) and—since life is built of carbon, through the growth of organisms and the recovery and restoration of ecosystems; and fixing nitrogen through leguminous plants.

Other services—such as forests regulating watersheds—provide local benefits. New York City’s Catskills and the forested watersheds of a number of Latin American cities, for example, provide reliable water in both quality and quantity. People turning on the taps rarely give a thought to the biodiversity responsible, and—even if they do—they are unlikely to be aware that the watershed ecosystems are simultaneously pulling CO₂ from the atmosphere. In Australia the caterpillars of subfamily of moths (mallee moths) are central to decomposition and soil formation for the “dry continent”—because they are uniquely capable of breaking down leaf litter laced with protective compounds from countless species of gum trees.

The time has come to halt the degradation of biodiversity which sustains humanity and the rest of life on Earth. We need to take on planetary scale efforts to safeguard the living global commons through massive campaigns to restore ecosystems and reduce the atmospheric load of CO₂. That would not only reduce the global rate of extinction to one approximating its normal, historic rate, but undergird sustainable development. The destinies of life on Earth and of humanity are inextricably intertwined.



Embracing the SDGs' complexity

PAVAN SUKHDEV
Founder, GIST Advisory

Food and diet illustrate how the issues threatening the global commons—and their solutions—are intimately interlinked

More than a year has passed since the world's governments agreed the sustainable development goals (SDGs). But as the theoretical rubber of their targets and indicators meets the road of practical policy reform to implement them, we are hearing a discordant sound.

The noise does not in any way resemble the well-crafted orchestral score that might be expected while implementing such long planned goals. This is a familiar challenge for sustainable development: policymaking typically follows the mandates and administrative boundaries of government ministries rather than “whole system thinking”.

Implementing the SDGs will add more dimensions to this challenge. It will, for example, involve drawing and navigating a map showing how they are interlinked across different economic sectors and policy domains—and understanding how policy responses that target one goal will help or hinder progress towards others.

Food and agriculture illustrate the point well. For a start, SDG two is about ending hunger, sustainable agriculture, and achieving food security and improved nutrition. Yet, since fish provide the main source of animal protein for more than a billion people in the developing world, are food security and better nutrition even possible without first achieving SDG 14, which entails conserving and sustainably using the

oceans? At present, we seem intent on competitively mining fish stocks to depletion and destroying underwater life in defiance of both common sense and good economics.

Food systems are undermining human health, and permitting—even promoting—inappropriate diets and unsafe foods.

The relationship is similarly strained when it comes to life on land, the subject of SDG 15. We already use around 40% of available land for growing our food—three-fourths of it for growing meat and feedstock for livestock. That is projected to reach a staggering 70% under “business as usual”, which would ring the death-knell for many terrestrial ecosystems and significantly threaten land-based biodiversity. Our food system also generates more than a quarter of the greenhouse gas emissions driving global climate change, the subject of SDG 13. This connection also works dangerously in the other direction: some of our most important staple crops are vulnerable to a changing climate.

Nor do these interlinkages stop with the SDGs’ ecological foundations—life on land and under water, and climate change—they continue through their “social” layer as well. Food systems are undermining human health, and permitting—even promoting—inappropriate diets and unsafe foods. As last September’s Global Nutrition Report states: “Diet is now the number one risk factor for the global burden of disease”.

This defines perhaps the biggest health challenge of our times, and takes us to the heart of SDG three, which aims to ensure healthy lives and promote wellbeing for all ages. While an estimated 0.8 billion people remain hungry, another 1.9 billion consume over 3,000 kcal/day—well above the World Food Program’s recommended 2,100 kcal/day. Far from reducing inequalities—as envisaged by SDG 10—our food system appears to be adding to them. Obesity is growing in developing as well as developed nations—especially among children

whose diets are increasingly dominated by processed foods high in fats and carbohydrates, and sugar-laden fizzy drinks. Thus SDG 12 on responsible consumption and production is also comprehensively challenged by the food system.

Many other goals targeting social change—such as SDG one on poverty and SDG 10 on reduced inequalities—depend on biospheric resilience and stability, and on equitable access to abundant natural capital. Indeed the biospheric goals (six, 13, 14, and 15) can be envisaged as the base of a wedding cake. Stability and resilience are essential in achieving them. One level above them are the “social” goals where equitable access is critical, while the final layer is made up of economic goals, driven by productivity and efficiency.

On the positive side, tracing these interlinkages to their logical conclusions reveals system-wide solutions. Agriculture, for example, is the world’s largest employer, with over 1.3bn jobs—around a billion of them in small farms of under two hectares. If policy reforms could be focussed on making small farms better—lowering risks, increasing yield, and achieving fairer prices—that would go a long way to achieving SDGs one, two, 10, and five (on poverty, hunger, reduced inequalities, and gender equality).

Furthermore, a strong case is emerging that shifts towards healthier diets with more plant-based foods, and less meat could cut food-related greenhouse gas emissions by an estimated 29-70% as well as reducing mortality by 6-10% by 2050. If this change could be achieved, it would also go a long way towards achieving several SDGs—especially three, 12, and 13.

In other words, policymakers should not avoid, but rather embrace, the complexity of the SDGs, and seek collaborative and holistic solutions—cutting across ministries, sectors and the whole economy—as they seek to tackle poverty while protecting the global commons.

***The new world
of 2030 awaits!***



Just managing

NIGEL TOPPING
CEO, We Mean Business

The transition to a green economy must be fair—or it risks provoking an even greater backlash

The world economy is in a transition to a low-carbon one that respects the planet's climate and its other vital global commons. But will it be just, or unjust?

Just transitions happen when a failing sector or business is helped to move towards a new, low-carbon growth area. Some quite widespread examples are already under way. The former steel city of Pittsburgh, for example, is reinventing itself as a leading centre for developing self-driving autonomous cars.

As we move into a low emissions future, we need to ensure that the impact on local employment and economies is managed in a way that allows obsolete jobs to be replaced by equally skilled and well-paid, low-carbon ones. The B Team and Sharan Burrow of the International Trade Union Confederation have done a great deal to highlight how important this is.

But there is also a very real danger of an unjust transition. Blindness to unintended consequences—or a lack of adequate planning to ensure that opportunities for local jobs and economies are maximised—could lead to public sentiment quickly turning against efforts to combat climate change and safeguard the global commons.

The shift to electric vehicles continues apace. A recent report by Climate Action Tracker suggests that the last gasoline-powered car

will have to be sold by around 2035 if the world is to be on track to meet its target of keeping the rise in average global temperature below two degrees above pre-industrial levels. Certain car makers, including Volkswagen, have warned that this is likely to cost jobs because fewer components will be needed in production. Many companies, such as Tesla, are focusing on autonomous electric car prototypes. Unmanaged, these structural changes to the automotive sector will have huge implications for jobs in the automotive supply chain, and for professional drivers.

Some of this is creative destruction, as businesses either adapt or become gobbled up in the new order. And while, at a macro level, progress of this kind is exciting and paradigm-shifting from both an economic and a low-carbon perspective, that's not how it is likely to feel to the people whose usurped businesses and jobs are at stake. Instead of celebrating the closing of coal-fired power stations, we need both to acknowledge sensitively the impact of such a transition on individual people and communities, and to mitigate it as far as possible. Otherwise we only exacerbate divisions that already exist.

The current political polarisation around the world, particularly in Europe and America—the sense of injustice, of being left behind—whether justified or not, is fuelling populism and is potentially destabilising for society. We can't think narrowly about climate and the other global commons in future. We must also think more politically about the overall balance of jobs and wealth distribution. A resurgence of protectionism and anti-globalisation is both bad for business and likely to slow down positive change. When populist governments move in that direction they typically prop up industries

that would otherwise die out. Businesses should seek out new opportunities, rather than ask for the hand-outs that come from government protection. There are plenty of examples of businesses that have skilfully made such transitions. DSM used to be a coal mining company; now it's a materials and nutritional science one.

It is possible to engage constructively with the inevitable transition, supporting communities where jobs are being lost by attracting the industries of the future. Nissan's success in the north-east of England required bold private sector investment into a geographical market of available, trainable and skilled labour.

We can also take hope from the story of Ed Woolsey, a fifth-generation farmer from Iowa, whose crop has recently changed radically. "Before, I raised corn and soybeans and cattle", he told Bloomberg. "Now...I'm a wind farmer." He's part of a community collective that manages 10 wind turbines and sells the power to rural electric cooperatives. By 2030, it is projected that rural landowners in the US will generate as much as \$900m (£729m) a year in revenues from wind energy.

Importantly, this is investing in the future, not the past. Woolsey had seen the price of corn fall from \$7 a bushel to \$4.20 and finally to around \$2.70. He could have continued what he was doing and watch his situation slowly become untenable. Or, with a nudge from government (in this case a federal tax credit), he could transition to a profitable future. He chose the latter. We need to help others to do the same.

“Businesses should seek out new opportunities, rather than ask for the hand-outs that come from government protection.”



Losing Ground in a warmer world

N H RAVINDRANATH

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Transformational change is needed to solve crises in the vital global commons resources of fertile land and water which will be exacerbated by climate change

Two global commons resources, fertile land and water, will be critical as the world's population increases. Having crossed 7 billion in 2010—rising from about 3.7 billion 40 years earlier—the number of people is likely to rise to 9-10 billion by 2050. This presents a big challenge: can the world feed so many and provide them fresh water?

These resources are characterised by land degradation and water shortages. According to the United Nations, nearly 6bn hectares (14.8 acres) of global fertile land—two thirds of the total—is subject to different levels of degradation, most of it irreversible. This could potentially contribute to long term reductions in soil fertility and water-holding capacity, leading to declines in crop production, especially in the developing world.

The water crisis is already around us. Large parts of the world, particularly in developing countries, are already facing it in a severe form. It is common to hear of potential “water wars” within and between countries. Nearly 80% of the global population is estimated to live in areas with high water security threats, with 3.5 billion people facing the most severe category of them. If current land and water management practices continue, the land degradation and water crisis will accelerate.

Climate change will intensify existing difficulties in sustaining food production and providing fresh water to a growing population. The Intergovernmental Panel on Climate Change has concluded that it will worsen land degradation—most severely in the arid and semi-arid regions of the developing world. It will also impact both surface water availability and groundwater resources, through changes in rainfall pattern and warming, contributing to increased evapo-transpiration and run-off—which may, in turn, lead to additional demand for water for crops.

Globally, the area of land used for agriculture increased from about 1,372m hectares in 1960 to around 1,600m in 2012, and the Food and Agriculture Organisation (FAO), expects the demand for cropland to reach 1,660m hectares by 2050. The rate of increase in developing countries is significantly higher, from about 693m to 968m hectares between 1960 and 2012. Thus, even in the absence of climate change, large-scale conversion of forest and grassland is projected for the coming decades.

The FAO says that, though there has generally been an increasing trend in crop productivity over recent decades, the average annual growth rate in crop yields is declining and is projected to fall even further by 2030, even without the impact of climate change. Also, as is well-known, changes in diet patterns—with economic development and increasing incomes, especially in the developing world—are likely to increase demand for land- and water-intensive food products such as meat, milk and sugar.

The changing climate could lead to significant changes in land use patterns, increasing the amount required to produce cereals, fruits, vegetables, dairy products and meat both directly and indirectly. Land degradation, water stress, incidence of pests and diseases—all

expected to be exacerbated with climate change—will lead to reductions in crop yields, potentially requiring agriculture to expand into such global commons as forests and grasslands. And the expansion of biofuel crops—such as oil palm, jatropha, sugarcane and maize—as substitutes for fossil fuels, as a mitigation option, can also lead to large-scale conversion of these global commons. Meanwhile, forest fires, which have already reached crisis proportion in all the continents, will be exacerbated by warming and drought.

Reversing these trends will be a challenge. The Paris Agreement is unlikely to make any significant impact on any of the pressures on global land and water resources.

Transformational change is needed in land and water management to ensure sustained food production and fresh water supply. We need to address climate change more seriously than the Paris Agreement allows, halt land degradation, adopt sustainable practices to conserve and enhance soil fertility and water resources, and sustainably increase crop productivity.

Research is needed to develop climate resilient crop production and water management systems, which must then be disseminated on a large-scale, especially in the developing world. There may also be a need to change diet patterns, from land- and water-intensive products, to more healthy whole grains, fruits, vegetables and fish.

At present all the potential drivers of land degradation and water scarcity seem to continue unchecked, and climate change will only exacerbate them in coming decades. The global commons of land, water and biodiversity are threatened and we need a radical new approach to save them.



Making change decisive

KATHY CALVIN

President and CEO, the UN Foundation

The global consensus on climate change and the sustainable development goals is breathtaking in its speed and breadth

It was a unique moment when world leaders adopted the sustainable development goals (SDGs) in 2015. Every single government in the world—informed by input from millions of citizens, private sector leaders, and nonprofit experts—came together at the United Nations to agree to a collective, ambitious vision for a better future for everyone, at a time of considerable international tension in other domains. The vision outlined by the 17 SDGs includes the ambition to end poverty and hunger, ensure kids get quality education, empower girls and women as equal to men in all walks of life, and steward natural resources for the future health of all our societies.

In parallel, countries worked to craft what we now recognise as a landmark global deal on climate change, agreed in Paris at the end of 2015 and entering into force this November. While the two processes were separate, the SDGs and the Paris Agreement are indivisible in substance. Indeed, the SDGs include “urgent action to combat climate change” as Goal 13—and are only achievable if the curve of climate change is bent. Left unchecked, rising sea levels and extreme weather events such as droughts and floods, will set back global efforts to eliminate poverty, alleviate hunger, and improve public health, even as rising temperatures disrupt ecosystems on land and in the seas. Climate action, in turn, depends on ambition and innovation in the systems addressed by the SDGs—like agriculture, energy, and infrastructure.

The speed and breadth of global consensus around climate action has been breathtaking: countries acted to adopt the Paris Agreement on climate change unprecedentedly fast. It was reached in December 2015 and signed

in April 2016—and by mid-November made national policy by 111 countries that together ensured it would enter into force in advance of this year's Conference of the Parties (COP 22) in Marrakech.

The first major sectoral agreement to slow growth in carbon emissions—in civil aviation—was reached under UN auspices in October, and world leaders that same month agreed to phase out the production and use of hydrofluorocarbons (HFCs), which are powerful greenhouse gases.

Perhaps most importantly, there was widespread recognition and acceptance that the global development and climate agendas are one, and that country action on the Nationally Determined Contributions (NDCs)—or national plans—as part of the Paris agreement is fully consistent with pursuit of the SDGs—and indeed, of national economic development strategies.

Less than a year after Paris, 195 countries took the next step by endorsing the Marrakech Action Proclamation for Our Climate and Sustainable Development, calling for “the highest political commitment to combat climate change, as a matter of urgent priority”, noting: “This momentum is irreversible—it is being driven not only by governments, but by science, business and global action of all types at all levels.”

Agreements are important, but their promise is made real through action. Marrakech advanced on that front as well, with the announcement of numerous initiatives, including partnerships on energy efficiency, bioenergy, and African agriculture, and with a call by more than 365 companies and investors for the US to continue the leadership that has been widely heralded by business, citizens, and other stakeholders.

Indeed, the official COP itself was almost overshadowed by the dynamism on its margins: civil society's “green zone” had the look and feel of a trade show for low-carbon solutions, side events were lasered on implementation and action. Rather than debate about negotiations and texts, delegates sought out success stories of clean energy technologies and carbon-capturing farming practices.

Marrakech showcased how countries can reverse climate change while growing their economies and increasing wealth. The US put forward a Mid-Century Strategy for Deep Decarbonization (pdf) as did Mexico, Canada, and Germany—important long-term visions for reducing emissions by 80% by 2050, while maintaining robust economic growth. “Ambitious and sustained global action on climate change is not just an environmental priority, it is also a pro-growth economic strategy,” the report states.

The Climate Vulnerable Forum, a group of 48 countries with 1 billion combined citizens, pledged to achieve 100% domestic renewable energy production as rapidly as possible and to prepare mid-century low-carbon development strategies before 2020, affirming that “climate action does not limit development—it strengthens it.”

This dynamism, enterprise and innovation is the true legacy of the Paris agreement and is the reason that US leadership—however desirable, and however much in its economic interests—is not required for further progress. We have moved decisively from envisaging climate action as a burden and have come to see it as an unprecedented opportunity in national self-interest. Governments forged their plans as enhancing economic growth, wealth-creation, and long-term competitiveness, and for that reason they will make good on their pledges and raise ambition as benefits start to accrue.

Increased demand for low-carbon technologies, supported by enabling policies in many places, has set off a virtuous cycle of continuous improvement and falling costs that can transform the way we all live for the better. And, in 2020, when nations gather to reaffirm and strengthen the commitments they made before Paris, they will do so with the winds of the market and popular support at their backs.

The steps they take to limit the rise in global average temperatures to “well below 2C”—the Paris target—will also deliver for the SDGs. Today, more than a billion people still have no access to electricity. Providing them with “affordable, reliable, sustainable and modern energy”—as outlined in SDG seven—will spur economic opportunity and improved health, especially for women and girls now consigned to lifetimes of fuel gathering and of breathing toxic smoke as they cook over open fires.

UN secretary-general Ban Ki-moon presided over 2015's historic achievement of global agreements on sustainable development and climate change, and his persistent advocacy helped bring them both to the finish line. One year later, according to the UN's World Meteorological Organisation and every credible source, we are experiencing what is set to be the warmest year in recorded history for the third year running—underscoring the imperative of seizing the opportunity of these ambitious, interlocked plans. We have now started the shift toward a sustainable future for our children and generations to come. Together, we can make it decisive.



Middle class prosperity can save the planet

HOMI KHARAS

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The environment and development communities can unite in their approach to the rapidly increasing global middle class

"The best things in life are free", says the old song. When it comes to the global commons—clean air, healthy oceans, conservation of diverse species—this is no longer true. We've abused the great systems of our planet for centuries and now it's time to pay the bill.

There are two ways of protecting the commons. The first is to reduce the human footprint. This was the early message of the Club of Rome in its famous *The Limits to Growth* treatise, published in 1972. The second is to innovate technology or approaches.

Agenda 2030, and the consensus on the global goals, is all about the second way forward, where the key to success is to create bridges between environmentalists, who argue for the primacy of sustainability, and development practitioners who put people first.

It would be naive to dismiss the tensions between these communities, despite the fact that they share common goals. Everyone wants both prosperity for individuals and a healthy planet. But the tools that are used to try to achieve these aims often have conflicting effects.

The most obvious example of this tension is the divergent views on coal-fired energy plants. The low upfront financial costs of such plants

make them appealing to many policymakers interested in economic growth, while the devastating environmental costs (in terms of both global climate change and domestic health hazards) make them anathema to environmentalists.

In this case, technology now provides a suitable alternative. In India, the cost of solar power may now be cheaper than coal. Win-win solutions based on renewables and energy efficiency can provide both growth and lower carbon emissions.

In other instances, however, technology is not the answer, at least not at current rates of adoption. The modern version of constraints to growth is the ambivalence of many environmentalists towards the emerging middle class in developing countries. People in this class consume more goods and services than poorer ones. They pollute and degrade more: plastic bags from their shopping; carbon emissions from their cars; degraded land from the food they waste; reduced water tables from irrigation needed to produce animal feed grain production; coral reef destruction from sun-screens used on vacations. The list is long.

It is no use trying to fight against middle class progress. The economic and political forces are too strong. The middle class—now about 3 billion people—is growing more rapidly than at any other time in history, thanks to fast economic growth in China, India, and other Asian countries. It probably took 150 years from the start of the Industrial Revolution to create the first 1 billion middle class consumers, somewhere around 1985. The second billion took 21 years to cross the threshold; the third billion just 9 years. If the global economy recovers along the lines projected by the International Monetary Fund, 2 billion more will be added to the middle class by 2028—a total of 5 billion people.

The fundamental issue, then, is how to reconcile this massive middle class expansion with a healthy planet. Appealing to people's good nature will not work. Individuals do not see themselves and their normal daily habits as doing significant harm to the Earth. There is a large collective action failure—each individual thinks they can leave the problem to someone else to deal with—so few people change their behaviour and habits. And when they do, the impact is small. In the US, a single person's carbon emissions only decline by about 5% when he or she becomes more conscious of his or her carbon footprint and switches to using LED light bulbs and driving electric cars.

Equally, trying to use economic incentives like taxes and regulations could backfire if these are seen as harming prospects for growth and prosperity. The middle class may be sympathetic to the cause, but they also care deeply about their wallets. Data from the World Values Surveys suggest that many in the middle class are not prepared to pay higher taxes to support a better environment even within their own country, let alone globally.

There are, however, other ways through which the middle class impact on the global commons can be mitigated. In the long-run, a larger middle class can be a powerful force for halting population growth. Look at Europe today: its population growth rate is only about 0.2% per year. Indeed, almost all the world's projected population growth is happening in places with small middle classes like Nigeria and the Democratic Republic of Congo.

The link between the middle class and population growth is clear. Middle class households are more educated and more urban. They invest more in their children. Their daughters go through secondary school and on to higher education in many places. This has a dramatic effect on fertility. A woman with no schooling has, on average, four to five more children than one who completes high school.

Added up across the world, the impact can be considerable. The United Nations, which puts out different scenarios for population, thinks the most likely global number for 2100 is 10.9 billion (compared to 7.4 billion today). But demographers at the International Institute for Applied Systems Analysis in Vienna figure that the population in 2100 could be only 9 billion people, if better education is taken into account.

This reduction by 2 billion shows what can happen if a package of access to schooling and family planning is made available to middle class households. In fact, total aid for education would be doubled if just one-eighth of the \$100bn (£79.8bn) promised annually in climate aid was redirected to it: this would help build prosperity and protect the planet at the same time. Win-win propositions like this can help create bridges between the environmental and development communities—a coalition that is desperately needed to safeguard the global commons and achieve the global goals.

The fundamental issue, then, is how to reconcile this massive middle class expansion with a healthy planet.

The Amazon's new industrial revolution

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Saving the rainforest and creating a new inclusive economy by catalysing an entrepreneurial revolution and constructing a digital Amazonian 'Library of Alexandria'

The Amazon system exemplifies the global commons on which the health and stability of the planet depends. Its ecosystems harbour about 10-15% of the planet's land biodiversity. Its abundant rainfall—averaging about 2.3 metres a year—makes the region an important heat source for the atmosphere, while generating an estimated 210,000-220,000 cubic meters of river discharge every second, approximately 15% of the world's freshwater input into the oceans. It stores an estimated 150-200bn tonnes of carbon and has been functioning as a potent carbon sink removing over 2bn tonnes of CO₂ a year. And it presents a mosaic of ethno and linguistic diversity.

Like other global commons, it is under threat from large-scale drivers of environmental change operating simultaneously and interacting non-linearly. These are dominated by land use change and climate changes—due to global warming and deforestation—which may, in turn, increase extreme climate events and fires, increasing the exposure and vulnerability of tropical forests. Earth system models predict that up to 60% of the Amazon forests could

vanish by 2050, with most replaced by degraded cerrado-dry savannas with far fewer species, storing much less carbon.

There have been two dominant policy pathways in the Amazon. The first approach has focused on converting or degrading forests to produce either tropical timber or protein, such as meat and soya, or to build massive hydropower generation and extractive industry capacity: it has been responsible for massive deforestation, among other significant negative effects. The other has been a valuable nature conservation approach which has legally protected large swathes of territory from any economic and human activity, except by indigenous peoples. These now comprise 2.3m square kilometers, covering about 54% of Brazilian Amazon forest.

The prevailing model for rural development over the last half century—replacing forests with agriculture, cattle ranching and large scale hydropower generation—has long been outdated for a number of environmental, economic and social reasons. It has not resulted in wealth creation or a better quality of life for those living in the region. The challenge is to reconcile it with a new model of sustainable development of the Amazon.



Large reductions in the rate of deforestation in the Brazilian Amazon—80% between 2004 and 2014—open up opportunities for an alternative model based on seeing the Amazon as a global public good of biological assets for creating high-value products and ecosystem services. The urgency of finding this, however, has become more evident through a recent reversal: the Brazilian Institute of Space Research reported in late November that deforestation rates have gone up from 5,000 in 2014 to nearly 8,000 square kilometers in 2016.

Biological systems in the Amazon are the result of million years of evolution. We are rapidly gaining understanding of how things are created in nature, how organisms sense their surroundings, how they move in their environment and how they behave and function. This is bringing within reach a third pathway where we aggressively research, develop, and scale up a new high-tech approach that sees the Amazon as a global public good of biological assets that can enable the creation of innovative high value products, services and platforms for current, and entirely new, markets.

In the short-term—and with a low-tech approach—it is quite feasible to develop a number of biodiversity-based value chains capable of reaching global markets. Already there are some pioneering examples, following in the wake of Brazil nuts and babassu. Production from the assai palm, for example, has already reached the multibillion-dollar scale. An alkaloid found in the leaves, branches and flowers of jambu is described in patents as appropriate for anesthetic, antiseptic, antiwrinkle, toothpaste, gynecological and anti-inflammatory uses. The bacuri fruit is in increasing demand for ice cream, candy and juice products, while the oil extracted from its seeds is used in the cosmetic industry and as an anti-inflammatory substance in traditional folk medicine.

Beyond such new developments, lies the potential for biomimicry in learning from—and then emulating—Amazonian natural forms, processes and ecosystems to create more sustainable designs and innovations. The Tungara frog species, for example, creates long-lived foams that have inspired new energy generation and carbon sequestration technologies. Plants have directly provoked potentially much cheaper solar cell designs, while photosynthesis, and the ways in which microorganisms generate their own energy, have given rise to innovations in advanced microbial fuel cells.

There is also significant innovation potential in learning from the Amazon through biomimicry-inspired nanoscience—reproducing complex biological systems on a nano-molecular scale, and developing new environmental friendly processes and technologies for preventing and remedying pollution, new bioinspired textile structures, new revolutionary energy production and carbon sequestration technologies, new robotic applications, and new autonomous vehicle artificial intelligence algorithms, to mention a few.

Our approach would both embrace and enhance the emerging Fourth Industrial Revolution, an accelerating confluence of technology breakthroughs covering such wide-ranging fields as artificial intelligence, robotics, the internet of things, blockchain distributed data ledger technologies, synthetic biology, DNA editing, nanotechnology, energy storage and quantum computing, as well as biomimicry.

This new economy has the potential to become much larger than the present one based on the unsustainable use of natural resources. Key to this would be to leverage artificial intelligence, internet of things and blockchain technologies to build a digital Amazonian “Library of Alexandria” to create an open and immutable registry of rights and obligations associated with all biological and biomimetic knowledge assets of the Amazon. This would both catalyze disruptive innovations and provide a needed mechanism to build trust.

Such system-level change in the Amazon cannot be executed single-handedly. We are in the process of setting up a coalition of the willing with leading public, private, academic and philanthropic actors, engaging indigenous peoples and uniting the best capabilities of R&D centres, universities, technology startups and visionary companies all over the world to set in motion the entrepreneurial revolution required. If successful, this new development model could be applied to all tropical regions helping to preserve the vital global commons of the Earth’s great biological diversity.

More details can be found in a recently published article, *Land-use and climate change risks in the Amazon and the need of a novel sustainable development paradigm in the Proceedings of the National Academies of Science (PNAS)*.



Transforming globalisation

MARK MALLOCH-BROWN

Chair of the Business and Sustainable Development Commission

The sustainable development goals present the biggest business opportunity of our time—and they are the responsibility of everyone

Mid 2016 may be remembered as the summer of globalisation's discontent, one that has arguably been decades in the making. Though it helped bring about a golden era of growth, trade, and foreign direct investment, globalisation has not benefited society equitably, and it has forged ahead at calamitous expense to the environment.

On the upside, extreme poverty declined by more than 50% from 1990 to 2015. But the chasm between rich and poor is widening. Oxfam reports that the combined wealth of the richest 1% will overtake the remaining 99% of humanity by the close of this year. Climate change will only exacerbate this perverse inequality. Unabated, it threatens to push more than 100 million additional people into poverty by 2030.

Against this backdrop, the global economy is facing strong headwinds: stagnating wages, stuttering growth and job creation, decreasing trade and cross-border capital flows, and increasing environmental impacts. There is also the enormous task of creating 600m new jobs in the next 15 years to absorb a growing global workforce.

All this has led to a perfect storm that has heightened social and economic uncertainty, and (in some places) instability. We urgently

need a new kind of globalisation—one that brings billions more people to sup at its table, rather than just the elite few, and ensures future environmental abundance.

The importance of the global goals

The Business and Sustainable Development Commission (BSDC), launched in January 2016, was founded on the belief that the sustainable development goals are the world's roadmap to a more inclusive globalisation that ensures no one is sidelined by economic progress. Backed by 193 countries, the global goals, as they are popularly known, consist of 17 objectives for ending poverty, closing the gap on inequality, effectively tackling climate change and protecting our finite resources by 2030.

The dominant perception is that the responsibility for achieving these ambitious objectives rests with government alone. This is a fallacy. It will take government, business and society working in concert to achieve the transition. And, in truth, it will particularly require the capital, innovation and capacity that only the private sector can unleash. What we need—and urgently—is a radical shift in perception by the private sector to view the global goals as the greatest economic opportunity any generation has had, rather than a burden and constraint to growth.

The Business Commission's core purpose is to achieve this shift by making a compelling case for the private sector to put the global goals at the heart of its business, and thus accelerate the world's transition to sustainable and inclusive markets. As part of our argument, our flagship report—to be launched in January 2017—will quantify the economic value of achieving the goals. Our early findings show that pursuing innovative, sustainable business models could unleash trillions of dollars in new opportunities across four key systems—food and agriculture, cities and mobility, energy and materials, and health and wellbeing—alone.

Change is already underway. Companies are spawning ground-breaking innovations and new ways of operating—and not just the innovative newcomers that we call global disruptors, or their local counterparts. Some long-established companies like Unilever—whose CEO, Paul Polman, is a founding member of the Commission—are also leading the charge. By shunning short-term goals, which prioritise immediate profit over creating shared value, these radical incumbents are benefiting from their focus on sustainability. Indeed, Unilever's

sustainable living brands are growing 30% faster than the rest of its business, and delivered nearly half of its total growth in 2015.

A united approach

But these companies remain the exception. Our commissioners—representing major multinational corporations as well as civil society—have joined the Business Commission because they believe the world can achieve the goals with a critical mass of CEOs, investors and entrepreneurs who see these challenges as opportunities of substantial value.

New financing approaches will be needed to bridge the estimated \$2-3tn annual funding gap required to fulfil the goals. This will involve a combination of new financial models, and investors who recognise both the risk of social and environmental externalities affecting asset values, and the higher, long-term returns generated by strong environmental and social performance.

Unless the private sector earns the social license it needs to unlock these new opportunities, the global goals risk being remembered as just good intentions. The essential foundation is for business and government to gain trust with society. This will require business to relinquish short-term thinking and the relentless drive for profit without purpose—and to engage with government and society in an entirely new way through a social contract that reinforces all of their abilities to thrive.

The sustainable development agenda is about better markets and better government. The Business Commission argues that business, government, and society can work together to ensure a fair transition to stem the tide of global turbulence and instability, and to bring the market shift that is already underway to both speed and scale. Together they can encourage environments that foster new enterprise and employment, do more to support small- and medium-sized enterprises, and create policies that provide greater economic security for everyone, particularly the most vulnerable.

The Business Commission's ultimate goal is to create the sea change needed to make sustainable development the new business norm. Our commissioners represent a number of industries, but they are just the start of what we hope will be a business-led movement that will help to transform the private sector and achieve the global goals by 2030.



Turning the tide on ocean degradation

YOLANDA KAKABADSE
President, WWF International

Momentum is building up to conserve the vital global commons of the seas, halting its decline into a vast saltwater desert

Underneath its vast blue surface, the ocean's value—to our planet and people alike—is almost incalculable. It puts food on the table and underpins trillions of dollars of economic activity worldwide. It produces 50 % of our oxygen, absorbs heat and re-distributes it around the world, and regulates the world's weather systems. Quite simply, life could not exist without these enormous marine resources and the goods and services they provide, seemingly endlessly.

Furthermore, the ocean's beauty, mystery and power has inspired us for centuries, drawing us to enjoy its shores, explore its wild vastness and discover its hidden treasures.

But this global commons that inspires and feeds us, stabilises the climate and provides countless other benefits is showing signs of failing health. Such pressures as habitat destruction, pollution and overfishing have been rapidly building for the last hundred years. Today, almost 90% of global fish stocks are fully or over-exploited, leaving very little room for feeding a rapidly increasing population.

The impact of this excess harvesting and dumping is being exacerbated by climate change and unprecedented changes in ocean temperature and acidity. Last month the extent of sea ice in the Arctic and the Antarctic hit record lows every single day, continuing the worrying pattern that began in November. And a new UN study

released a few days ago warns that, if current trends continue and we fail to tackle climate change, the world is on track to lose its tropical coral reefs by mid-century.

If the ocean was a company, its stocks would be plummeting and its shareholders demanding action. The message is clear: we are decimating ocean assets, and the ocean economy will fail if we do not respond.

The ocean belongs to everyone—and to no one—and too many have taken too much. Centuries of overuse and neglect threaten to leave us with a vast saltwater desert. It is time to change the way we see the ocean—from a place where we take what we want and dump what we don't, to a shared resource of immense value. Governments, companies, NGOs and citizens need to pull together to turn the tide on failing ocean health. It cannot just be the responsibility of governments.

And the tide can be turned. In many places this is being done. I am heartened by great progress over the past year. In November, 24 countries and the European Union agreed on the world's largest ocean protection plan, the culmination of decades of efforts to safeguard the Antarctic's Ross Sea, a landmark agreement which shows how nations can come together to make real progress for the planet at a critical time.

Momentum and awareness is also building nationally: new marine protected areas were also announced in 2016, including off the US, Chile and Malaysia, to name a few. This gives me real hope for ocean conservation everywhere.

Increasing numbers of local communities are also doing truly inspirational work to protect and manage their islands and local coastlines. The Local Managed Marine Area Network (LMMAN) in Asia and the Pacific provides one example where communities in developing countries are taking the initiative to secure their ocean futures.

Indeed there was positive news—even as the world witnessed the shocking impact of the third global coral bleaching event. The Belize barrier reef system—the longest in the northern hemisphere and a world heritage site—received a reprieve from seismic surveying. Following an outcry from concerned citizens, national civil society groups and international conservation organisations (including WWF) and their supporters, officials in Belize agreed to suspend the seismic portion of offshore oil exploration, bringing relief to the 190,000 people—over half of the country's population—who depend on the reef for their lives and livelihoods.

But so much more needs to be done. We must ride a new wave of determination as we look toward 2020, the year when the commitments made under the Paris climate deal will kick in. Countries will also need to meet international biodiversity targets that year and the first environmental actions under the globe's new sustainable development plan—where the ocean has its own dedicated goal—will be due.

These tools provide the frameworks we need for action towards a sustainable future for the hundreds of millions of people who rely directly on the ocean for their food and jobs—and for all humanity which ultimately depends on the ocean's critical role in maintaining the health of our planet.

We have the tools, the know-how and the technology to address the root causes pushing the ocean to the brink. Business has a strong vested interest in healthy oceans: we need it to lead the way with visionary leadership to translate momentum into action. Businesses can yet again be the trailblazers in protecting our planet's incredible biodiversity and its life-enabling ocean. No effort is a drop in the ocean when the stakes are so high.

“If the ocean was a company, its stocks would be plummeting and its shareholders demanding action.”



The care horizon

ERIK SOLHEIM
Head of UN Environment

The global commons must be brought closer to people if they are to care enough to safeguard them

For ages, our safety, security and prosperity meant mining—literally and figuratively—the resources around us.

Our impact on the commons—our oceans, our atmosphere, biodiversity, and other complex global systems—was rarely noticed. For many, damaging something like our atmosphere was simply too abstract.

Most simply didn't care because changes didn't touch their daily lives. But we have the technology to show how it does so now. We know that the concentration of greenhouse gases in our atmosphere is growing steadily. We know that our oceans are heating up, killing coral reefs, and that currents of plastic debris flow around the planet. We know that we've fished and hunted untold numbers of species to extinction, and destroyed habitats of countless more.

We know all this, but there is a certain inertia that we can't seem to shake. There is no longer the excuse that we are ignorant of our individual impact, yet still many find it difficult to care. Why?

We tend to have a natural upper limit on what we can care about both in proximity and time: a care horizon. We care about things that are close to us. We worry about the safety and security of our family and community, about paying bills, about making ends meet. Even though

we are aware of great global problems, it is difficult to motivate people to tackle issues outside their care horizon.

The answer to the tragedy of the commons is the answer to how we bring it within this horizon. We are smart enough, and have resources aplenty to solve our problems. We need the will and motivation—personal and political—to do it. For that to happen, we need to make an appeal within the care horizon.

Take our atmosphere. Few people personally relate to carbon dioxide emissions. But billions live in cities where they can see, smell and taste horrendous smog. Around 7 million die from air pollution every year. Nobody likes dirty air. So they let their politicians know. And governments hustle to fix it.

In China, for example, hundreds of millions have been brought out of poverty, but the people now endure a scary amount of air pollution as a result. They have made clear that they have had enough, and the government is now working hard to solve the problem.

And here lies the trick: by ridding ourselves of air pollution, we are ridding ourselves of countless greenhouse gases and pollutants that are contributing to climate change. Broad-based appeals to protect nature, especially in countries where exploiting the environment is an easy—and often the only—source of income, is ineffective. If you were struggling to feed your family, would you think twice about cutting down protected trees?

We need to prove that protecting the environment is profitable and in everyone's best interests. We can do this by holding up successful examples. In parts of coastal Kenya, fishermen have traditionally cut down mangrove forests to make boats. With the advent of carbon markets, some of them are now being paid tens of thousands of dollars a year simply to protect mangrove ecosystems along the shore. They have found another way to make their boats. And as mangroves come back, so do fish stocks, helping their core business, and restoring the marine ecosystem as well.

By appealing to the immediacy of the fishermen's financial needs, multiple ecosystems are being saved and rejuvenated. The care horizon also obliges us to speak to people who are outside the environmental echo chamber. As environmentalists, we spend far too much time preaching to the converted. If we can't make protecting the environment a kitchen conversation from Kansas to Kazakhstan, then we are failing. We should be speaking a language that people understand, and connect with.

None of this is to say that broader approaches are not needed or are ineffective. Very much the opposite. Not every problem can easily be brought close to people. But we can make fast progress where problems can be brought within the care horizon. Nobody wants their story to be a tragedy. If we personalise the tragedy of the commons, we ensure that people will personally work towards a happily-ever-after.



Waste not, want not

ROLPH PAYET

Executive secretary, Basel, Rotterdam, and Stockholm Conventions

Managing pollution and waste soundly promotes economic growth as well as protecting the global commons

Society benefits from hundreds of thousands of chemical products, but some have undesired effects. We also produce a lot of waste, much of it hazardous, and seem to think it will go away and vanish. Yet - despite being separated by half a century and half a planet - Rachel Carson, and the Beijing anti-smog police are united in clearly demonstrating that chemical products damage not just the environment and human health, but jobs and the economy.

Our planet—and its global commons - do not have the means to detoxify wastes unassisted, so all countries should be concerned about managing and disposing of chemicals and products. The international legal framework for addressing growing air, land and water pollution—and illegal dumping of hazardous wastes across borders - is partly established by three global United Nations conventions: the Basel, Rotterdam and Stockholm Conventions. Any planet-wide solution for managing chemicals, wastes and pollution implies implementing them effectively.

Toxic smogs engulf many mega-cities, up to a reported 12.7m metric tonnes of plastic enters the oceans each year, and a reported 40-50m tonnes of electronic waste illegally crosses borders annually. All are consequences of unsustainable consumption and poor management of polluting products.

After traversing our rivers, oceans and atmosphere, many of those chemicals end up in cities and villages, on our plates, and in our bodies. Most things around us derive from, or are contaminated by, some chemical product. Our children grow up with hundreds of chemicals

accumulating in their bodies. Human bodies accumulate more than a thousand man-made chemicals, some of which undoubtedly affect health, including retarding development in young children, prompting dementia in the elderly, and causing cancer. The World Health Organization attributes 12.6 million annual deaths to an unhealthy environment.

International negotiations on controlling and managing dangerous chemicals are often challenging, as they have to balance and trade off economic interests, impacts on markets, jobs, health, livelihoods and the environment. Placed in the right perspective, and subject to rigorous scientific assessment, the business case for managing chemicals and wastes better is strikingly evident. The World Bank estimates that air pollution costs the global economy about \$225bn (£182bn) a year.

Lost labour income and increased healthcare costs together justify efforts to reduce pollution and invest in alternatives—and create opportunities to do so - particularly in less-developed regions. There are significant opportunities for safer, non-toxic alternatives, for better design to extend value chains over products' life cycle, and for recycling: all can be exploited by industry for economic, environmental, and social gain.

Consumers send powerful signals to industry and governments. We have individual and collective responsibilities in how we consume and dispose of products and wastes, since pollution knows no borders. However all nations must urgently prioritise their management: what individual people or countries can do is limited.

The Stockholm Convention, with 180 national parties, was instrumental in banning the widespread use of DDT, and restricting it to such specific uses as managing malaria epidemics in certain regions. Efforts to find a cure for malaria and research into alternatives have also reduced its use.

So far the Convention has listed 26 persistent organic pollutants (POPs), unfortunately only a small fraction of the chemicals known to be toxic to human health and the environment. With financial support from - inter alia - the Global Environment Facility (GEF), many countries eliminated a large part of them from consumer markets and industrial production. By June 2016 the GEF had committed \$1bn, leveraging approximately \$3bn in co-financing - for projects targeted at global reductions, for example of: 10,200 tonnes of PCBs used in power transformers; some 100,000 tonnes of PFOS

used in carpeting, leather and upholstery; and 6,130 tonnes of obsolete POPs stockpiles.

Impressive progress, but challenges remain as large stockpiles persist in many parts of the world: leakage from them may result in air, water and soil contamination, causing environmental health issues particularly for vulnerable groups.

Industry remains an important partner. It has the know-how, technologies and resources to reduce or eliminate the use of such chemicals and develop better alternatives. Public-private partnerships brokered by the international community - such as the Partnership for Action on Computing Equipment - have made best practices widely available, and have developed guidance for governments and other stakeholders.

Adopting a life-cycle approach is key, as are policies and incentives to encourage and accelerate a shift towards seeing waste as an economic opportunity if managed properly, rather than an environmental, social and economic cost.

Nevertheless, new chemicals and products proliferate and waste increases as do demands for chemicals in food production. These continue to strain meagre resources for sound management. The global chemicals industry earns more than \$5tn annually but contributes less than 1% of that to managing chemicals and wastes, through the GEF chemicals and waste portfolio (\$2.7bn) and the UN Environment's Special Programme (\$14m).

Sound management of chemicals and wastes must thus be mainstreamed throughout all the sustainable development goals, in which aspects of their use are ubiquitous. Focussing on impacts on the global environment and human health helps solve challenges—whether climate change, biodiversity loss or chemicals and waste management—and promotes wider sustainable development.

The conventions' Conference of the Parties in April will address some of these challenges and explore a greater role for industry. The conventions create opportunities not barriers. Pollution, in all its forms, undermines economic development, allowing poverty, instability and other crises to persist. The SDGs will surely fail if we cannot halt and reverse the rising tide of contamination, ocean plastics, toxic waste, and poison pumped into our shared planet. But sound management of chemicals and wastes will make it healthier, wealthier and more productive.



Sustainability must create good jobs

SHARAN BURROW

General secretary, International Trade Union Confederation

A recipe for rebuilding both trust in business and the global economy, with the dignity of decent work, while acting on climate to safeguard the global commons

The world economy has grown three times richer over the last 30 years, yet working people have been marginalised. People are frightened about the future. They want to know there is security and opportunity for themselves and their children.

If working people don't feel like they have a secure future, if people can't earn a minimum wage on which they can live with dignity, if there is no rule of law to sort grievances from disputes in the workplace and if there is a dominant supply chain model of low wages and insecure and unsafe work, trust breaks down.

The sustainable development goals —also known as the global goals — can make a real difference. In the private sector alone, an estimated 380m new jobs could be created by 2030 through achieving them. Together, the goals put business, governments and communities on a path to end poverty with the dignity of decent work as the catalyst to achieve it.

The Business and Sustainable Development Commission, on which I served, reported in January that putting the goals at the heart of the world's economic strategy could unleash a step-change in growth and productivity, while creating a world that is both sustainable and inclusive —but that this would require radical change in the business and investment community. Such change is urgently needed, not least for the up to 94% of the workforce of 50 of the world's largest major multinationals which is

effectively hidden. Global supply chains —now the dominant source of wealth in the global economy —depend upon them but they are not directly employed and are in low wage jobs with few rights.

Companies take little or no responsibility for these workers, knowing that this is a model of low wages, insecure and often unsafe work, and that informal work and modern slavery are increasingly rife in their supply chains. People often have no knowledge of who they really work for in global supply chains. What they do know, however, is that the business model, and the social contract between workers and business, is broken.

Two hundred million people are now unemployed worldwide, well above 2007's pre-crisis level. Yet by 2030 there will be 7% more people aged 15-24, over 80% of them in Africa and Asia. Overall, 600m new jobs will be needed over the next 15 years.

Those in work, and their families, face a struggle, at best to live on their wages. A global poll on wages and inequality across nine countries representing over half of global GDP, carried out for the International Trade Union Confederation, shows that 45% of the world's people are living on the edge with another 52% just about managing.

The overwhelming majority of people, therefore, have no buffer for the future even if they get by one day at a time. A significant share of households, even in industrialised countries, have experienced flat or falling real incomes for a decade or longer.

The share of labour in national income has declined by, on average, 10 percentage points of GDP in industrialised economies over the last three decades. This has serious inter-generational effects. Jobs and gender gaps are not shrinking —and neither is the level of youth unemployment.

Income inequality has increased in 22 out of 25 OECD countries with comparable statistics. OECD work shows that in all countries the “very top of the income distribution” have benefited most.

These factors have combined to raise the real prospect of secular stagnation and have contributed to a popular backlash against governments, institutions and the very functioning of economic systems. All this inequality is by design. Workers know it and they resent the behaviour that perpetrates it.

In the short term, inequality is stifling recovery. In the medium term, it is fuelling public mistrust, creating the conditions for rising populism. In the longer term, it will result in rising skills gaps, increased unemployment and

fear of survival on stagnant or declining incomes. The anxiety generated by all this —in the absence of just transition measures —mitigates against a smooth transition to a zero carbon economy.

We need an industrial transformation agenda to create the jobs of the future. We need innovative industries and industrial policies which design their production around looking after workers' health, respecting the environment, establishing safer processes, and researching and developing clean technologies. As this must happen holistically during the whole product life-cycle and along the entire supply chain, the global job-creating potential of such a transformation is convincing.

At a minimum, businesses who commit to the global goals should ensure that jobs throughout their supply chains are safe and integrate business into their operations using the UN Guiding Principles on Business and Human Rights.

We have a shared responsibility. Trade unions engaging in social dialogue with business and government give workers a voice in securing dignity at work and this rebuilds the social contract. With dialogue we can achieve real reform.

There has been progress. Since 2000 there has been an increase in global framework agreements between multi-national firms and global union federations, where companies consent to respect workers' rights and to promote decent work worldwide within their subsidiaries and along their global supply chains.

The G20 under the German Presidency can take a lead by resetting the parameters for rights, the rule of law, social protection, wage mechanisms, and —consequently —shared prosperity.

Business needs to adopt the global goals and to look at how they make their supply chains and their key operations not just sustainable but work for working people, thus sharing prosperity.

A new social contract where people, their environment and economic development are rebalanced can ensure that everybody's sons and daughters are respected —with freedom of association, minimum living wages, collective bargaining and safe work assured. Only a new business model based on old principles of human rights and social justice will support a sustainable, zero carbon, zero poverty world.



We only have 20 years to save the oceans

JEREMY JACKSON

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Professor Emeritus at the Scripps Institution of Oceanography*

A revolution in thinking is needed to protect this vital commons

The oceans are alarmingly unhealthy and getting sicker fast. At first, crises were localised, as in the collapse of Newfoundland cod and the lifeless dead zone in the Baltic Sea due to runoff of agricultural waste. Now the problems are global.

Ocean fisheries have been pushed past the limit for the 1 billion people who have no readily available protein substitute, and worldwide there are now more than 400 marine dead zones—areas starved of oxygen—up from 49 in the 1960s. Global piracy, modern slavery, and a lawless supply chain are disguising the source, species, and healthiness of one fifth of global seafood. In 2012, almost three in five of 81 retail outlets sampled in New York City were found to be selling flagrantly mislabelled fish.

Rapidly warming and rising seas are powering stronger hurricanes and storm surges, eating away at our coastal lands and cities, presenting the ominous prospect of hundreds of millions of climate refugees within the next few decades. The UN's sustainable development goals for the environment, biodiversity, and human wellbeing will be impossible to achieve—with severe consequences for people and the global commons—unless we turn things around very fast.

Fisheries present the most obvious solutions. Over 80% of the global fleet make zero or negative profit, and is propped up by about \$35bn

(£27bn) in annual subsidies. Removing subsidies would dramatically decrease fishing fleets by roughly 60%; stocks would immediately rebound. Surprisingly few jobs would be lost because most are in small-scale fisheries with few, if any, subsidies. Fish catches in developing countries would stay closer to home, where people need them most, instead of being siphoned off to the US, Europe, and Japan.

Rebuilding depleted fisheries involves eliminating harmful fishing practices and establishing large marine protected areas to provide refuges. There have been important breakthroughs, including the 1990s United Nations ban on high seas drift nets to reduce the harmful bycatch of sea turtles and dolphins, though law-breaking remains a major threat. The UN also nearly passed a global ban on deep-sea trawling in 2006 and, despite this initial failure, the movement is still very much alive. In 2016, the European parliament banned all trawling below 800 metres in EU waters, as well as fishing in areas with vulnerable ecosystems.

The US, Australia, and the UK have established huge marine protected areas in the Indo-Pacific, and the international Commission for the Conservation of Antarctic Marine Living Resources designated the Ross Sea as the world's largest marine protected area (MPA) in 2016. The total proportion of the oceans in MPAs still hovers around 3%, with only 1% closed to fishing—but they provide critically important refuges for an enormous variety of species and the trends are moving in the right direction.

Closing the high seas to fishing would make financial as well as conservation sense. Bordering countries would make up for lost income from spillover into their national exclusive economic zones: more than 99% of high seas fisheries exploit species also caught in them. Only the half dozen wealthy countries that dominate the high seas fishery would lose out. Developing countries, which lack the resources to participate in high seas fisheries that reduce their stocks, would benefit and global income inequality from fisheries would halve.

Individual countries have begun to rebuild depleted stocks. The US has made progress under the 1996 revised Magnuson-Stevens Fishery and Conservation Act that mandates rebuilding overfished stocks within a decade. An independent assessment in 2013 showed that 70% of its stocks with well-developed recovery plans were no longer overfished: government statistics now suggest that just 16% of 233 stocks are overexploited. But the status of New England groundfish has worsened, raising questions about how nimble federal policies are in adapting to

local circumstances. The locally regulated lobster fishery in the Gulf of Maine, however, is booming through effective management.

Coastal pollution and dead zones continue to increase because governments have failed to regulate destructive industrial farming practices and sewage discharges that send topsoil and excess nutrients downstream. The nutrients also poison groundwater and reservoirs: in Iowa, it costs \$1,000 per person annually to make drinking water safe.

The irony is that green farming is booming, turning dramatically larger profits than the poison-addicted crops of genetically modified corn and soya beans that cause the problems. Eliminating the US ethanol mandate would tip the scales dramatically in its favour, with enormous environmental benefits. We know reforms can make a difference: coordinated efforts to clean up pollution in Tampa Bay, Florida, enabled seagrasses—critical habitat for shrimp and juvenile fish—to recover to 1950s levels.

The recent explosion in renewable energy may help curb the threat of ocean acidification that impedes reef corals and commercially important shellfish in building their skeletons. Ocean surfaces and the atmosphere are closely coupled, so reductions in carbon dioxide emissions should be rapidly reflected in surface water pH.

Increasing temperatures will have much longer-lasting effects and it is increasingly evident that global sea levels will rise one to two metres by 2100. Coupled with stronger storms and storm surges, that's bad news for the roughly 6% of global population living less than five metres above sea level.

Engineered barriers, as in the Netherlands and the mouth of the Thames, could buy perhaps a century of protection for well-situated cities that can afford them, such as New York. But there are few, if any, practical solutions for Miami and New Orleans, the coastal megacities of Asia and Latin America, or the low lying island nations of the Indo-Pacific. We need to prepare for massive human population displacements.

We are making progress on mostly local problems, but its pace is dangerously slow. We have failed to wake up to the deadly implications of climate change for coastal populations worldwide. Real progress will require a more realistic assessment of the risks—and a revolution in thinking that places the common good above selfish interests defending the status quo. We have at most 20 years to act.



Prosperity that preserves the planet

JEREMY OPPENHEIM

Programme Director, Business and Sustainable Development Commission

Growth that safeguards the commons will produce vast economic returns for business

This week, business leaders from the world's major economies—both developed and developing—meet in Berlin to consider a new industrial revolution. The B20 summit—mirroring the better known G20 meetings—will discuss issues that will decide whether the world achieves universal prosperity while safeguarding the global commons on which it ultimately and intimately depends.

The issues include energy, climate and resource efficiency, financing growth and infrastructure, and responsible business conduct—all under the unifying theme: “Resilience, Responsibility, Responsiveness: Towards a Future-oriented, Sustainable World Economy”.

The common thread to achieving the B20's ambitious and varied agenda lies in the sustainable development goals. Since these global goals were adopted in 2015—the year which also produced the Paris agreement on climate change—there have been a succession of dramatic developments.

2016 shook our assumptions about the global economy, with many asking whether the costs of globalisation are greater than its benefits. And now, more than four months into 2017, the world arguably faces more uncertainty than in the past two years. There's the increasing nuclear threat from North Korea, heightened political and economic turbulence in the UK following the triggering of article 50, and elsewhere, the uncertainty that comes with globally and regionally significant national elections in the UK, Germany, France, Italy and South Korea.

Yet the future is far from bleak. A growing wave of companies—including multinational, national and small ones—fundamentally believe that prosperity—whether global, national or for individuals—can only be achieved if it is founded on the principles of a more sustainable, inclusive model of economic growth.

Indeed, the Business and Sustainable Development Commission reported in January 2017 that putting the goals at the heart of economic strategy could unleash a step-change in growth and prosperity, and create an inclusive and sustainable world—if there is radical change in business and investment.

But these opportunities will not materialise on their own. Good disruption must take place. This will require breakthrough technology, such as digital platforms, as well as innovative financing tools. The private sector will not be able to accomplish this alone. Government must help to scale sustainable markets through smart regulation and forward-looking policies, in particular:

- **Establishing the right prices for natural resources.** Prices for carbon, water and energy do not reflect environmental or social externalities. Business leaders must work openly with regulators and civil society to shape policies that create a level playing field more in line with the global goals. This could involve fiscal systems becoming more progressive through taxing labour income less and pollution and under-priced resources more.
- **Creating the right regulatory conditions to attract private investment into sustainable infrastructure.** In all, \$90tn (£70tn) will need to be spent on infrastructure worldwide over the next 15 years. Aligning financial regulations with the goals would encourage long-term investment and reduce systemic risk, contribute to growth-boosting and much-needed infrastructure, and provide better returns for individual investors all at the same time.
- **Providing stronger incentives for long-term investing, including through blended finance instruments.** Achieving the goals is likely to require additional investment of \$2.4tn a year. This will depend on orienting the global financial system towards long-term sustainability, with public and private sectors sharing both the risks and returns. Enough capital is available: total private financial assets now stand at more than \$290tn, and are growing by 5% a year.

We must take a fresh strategic look at how best to mobilise and deploy a smart mix of public and private capital to drive sustainable infrastructure investment. The commission is mobilising a taskforce of leading institutional investors, sovereign wealth funds, development finance institutions, investment banks and private companies to lay out a blended finance action plan for the goals.

- **Encouraging businesses to step-up investment in developing their employees' skills and productivity.** Governments must deliver on much-needed shifts in labour and education policies to address underlying systemic weaknesses. This would enable business leaders to invest more to improve productivity, skills, resilience, access to credit—and as far as possible, ensure that no one is left behind. Such a task is becoming more important than ever, as new technologies create structural changes in labour markets across the world.
- **Stamping out corruption.** As the drive for greater transparency over beneficial ownership of anonymous companies is gaining momentum, regulators must tackle corruption more actively. The B20 has already publicly called for such increased transparency, estimating that corruption facilitated by the status quo adds 10% to the costs of doing business globally and inevitably hinders businesses' ability to align their strategy with the goals.

Business leaders who are serious about the transition to a sustainable economy can help push public regulation in the right direction, and scale up cooperation between governments and the private sector to achieve the global goals.

The rewards are great. The commission's report, *Better Business, Better World*, concludes that there would be an economic prize for business up to \$12tn, which could reach \$30tn through even broader global goal opportunities by 2030. By then, up to 380m jobs would be created.

The commission also identified 60 hotspots across four economic systems—food and agriculture, cities, energy and materials, and health and wellbeing—that could grow two to three times faster than the global economy, and generate business revenue and savings equal to 10% of forecast global GDP.

The next generation of purpose-driven economic growth is within our reach. So is the next era of purpose-driven competitive advantage. This week's B20 summit could help bring them about.



How to tell if a company really protects the global commons

KATE RAWORTH

Author of Doughnut Economics

Businesses must leave behind an era of reckless overshoot, and pioneer one of generous turnaround

What in the world have we inherited? Thanks to the 20th century's degenerative industrial design, our economies are systematically running down this extraordinary planet. We take Earth's materials, turn them into stuff which we use for a while, then throw away. This take-make-use-lose industry cuts against the very cycles of life, logging ancient forests and fracking the land, filling the atmosphere with greenhouse gases and the oceans with plastic—all in the name of turning a profit. We seem set to go down in history as the "era of reckless overshoot"—to be remembered as the generation that pushed the global commons, Earth's life-supporting systems, towards collapse.

Do we have the vision to turn this legacy around—and what role could business play in that? Over the past five years, I have discussed this with a wide range of business leaders, from FTSE 100 executives to the founders of community-based cooperatives—and have been fascinated by the wide array of their responses.

Maximising profits

The first and oldest response is simple: do nothing. Why change the business model when it is delivering strong returns? The aim is to maximise profits and this is mostly done entirely legally—so, until regulation hits a business' costs, many will carry on as before. For decades, most companies worldwide took this tack, treating sustainability as something they didn't need as it did not increase their share prices. But times have changed, along with the climate, and many now recognise that doing nothing no longer seems so smart, for people, planet or profit.

That's why the next response has become the most common: do what pays by adopting eco-efficiency measures that cut costs or boost the brand. Cutting greenhouse gas emissions and reducing industrial water use are classic efficiency measures that tend to lower company bills. Other businesses pursue "green" labelling to appeal to customers willing to pay a premium for eco-friendly products. This looks like a good start, but it is a long way off the scale of what is needed.

The third, more serious response is: do our fair share in promoting sustainability. To their credit, companies taking this approach at least adopt science-based targets for reducing resource use, from fertiliser and water to greenhouse gas emissions. But—as anyone who has been left holding the restaurant bill once fellow diners have chipped in with what they think is their fair share knows—it never quite adds up. Worse, "doing our fair share" can quickly flip into "taking our fair share". When some companies first learn about planetary boundaries—and the limits of pressure that can be put on Earth's systems—they behave as if they are looking at a cake to be sliced up and handed out. Trapped in the old mindset of degenerative industry, the first question that occurs to many of them is: how big a slice of that ecological cake is ours? How many tonnes of carbon dioxide can we emit? How much forest can we log? Calling for fair shares risks perpetuating the idea that running down the living world is still a corporate right worth fighting for.

Mission zero

The fourth response—a true step-change in outlook—is to do no harm, an ambition often known as "mission zero": designing products, services, buildings and businesses that aim for zero environmental impact. Examples include zero-energy buildings that generate as much

electricity as they use, and net-zero-water factories that continually recycle their internal water supply instead of extracting ever more water from stressed underground reservoirs.

Aiming for net-zero impact is an impressive departure from last century's degenerative industrial design—even more so if it includes not just energy and water but all resource-related aspects of a company's operations. It's a sign of impressive efficiency—but an avid pursuit of resource efficiency is simply not enough. As the architect and designer William McDonough said: "Being less bad is not being good. It is being bad, just less so."

And, once you think about it, pursuing mission zero's do-no-harm goal seems to almost intentionally stop short of something far more transformative. After all, if your factory can generate as much energy as it uses from the sun, why not aim to generate more? Instead of seeking merely to "do less bad", industrial design can do good by continually replenishing, rather than more slowly depleting, the living world. Why simply take nothing, when you can give something instead?

Giving back

That's the essence of the fifth business response: be generous and create an enterprise that is regenerative by design, giving back to the global commons that we all rely on. More than a task on a to-do list, it is a way of operating that embraces biosphere stewardship. Think of farms that sequester carbon and restore the soil as they grow food; buildings that put cleaner air back out into the surrounding city; plastics companies that turn methane into textiles to be used again and again rather than thrown away. Such enterprises serve to reconnect human activity with nature's cycles—and hence regenerate the living world.

Every company can ask itself: what are we currently set up to do? And, crucially, what changes in our company's design—from its values and purpose to how it is owned and financed—are needed to make the leap to regenerative industrial design possible? Once these questions are answered, business can play a key part in transforming our future and our reputation. We still have a chance to reinvent our legacy and—instead of reckless overshoot—be remembered as the era of generous turnaround. So what is business going to do?



Only green growth can bring prosperity

NICHOLAS STERN

Chair, Grantham Research Institute on Climate Change and the Environment at LSE, and President, British Academy, and

NAOKO ISHII

CEO and Chairperson of the Global Environment Facility

The next 15 years will determine the shape of the world for the rest of the century

Our global commons—the land, seas and atmosphere we share, and the ecosystems they host—are under severe threat from human activities.

We are at risk of irreversibly damaging the natural assets of the planet that allow human communities to thrive and prosper.

Our world is being depleted of plant and animal species at an alarming rate, our natural landscapes and productive agricultural land are becoming progressively degraded, and our cities are choking from air pollution and congestion. In addition to this, our atmosphere is filling up with greenhouse gases that are pushing us towards the potentially catastrophic impacts of climate change.

We are making the world a more hostile and difficult place for ourselves and for future generations. But we have the opportunity to save and preserve our global commons by implementing the global agenda created by the international agreements in 2015 on sustainable development, finance and climate change.

This agenda is based on the recognition that living standards can be raised and poverty can be overcome around the world only if economic growth and development is accompanied by action to protect the environment.

The agenda that preserves our global commons is also the only sustainable route to growth and poverty reduction. But action with real pace and scale is urgent: the window of opportunity is narrow.

The decisions we make over the next 15 years will determine what kind of world we will have for the rest of the century. Between now and 2030, we will build cities, energy systems and transport networks on a scale never before seen (pdf), bigger than the amount of infrastructure that already exists in the world.

If we build it badly, our global commons is likely to buckle under the strain, but if we make sure our new infrastructure is modern, smart, clean, efficient and resilient, we can ensure that our children and grandchildren have the opportunity to enjoy healthy and productive lives, and tackle poverty in our generation.

Much of the new infrastructure will be developed in what are currently classified as emerging markets and developing countries. Thus, it is the six billion who live outside today's rich countries who will in large measure determine the future.

More than half of the world's people are currently found in towns and cities and, by the middle of the century, it is likely that two-thirds or more of the population will be urban dwellers. The population of cities is likely to rise from about 4 billion today to 6.5 billion or more in the next three or four decades.

If we manage this extraordinary expansion well, we can have cities that are attractive and productive, where we can move and breathe, and where communities flourish.

If we fail, our cities could be profoundly unhealthy, damaging and unproductive places to be, particularly for poor people. And any chance of attaining the Paris Agreement's target of holding global warming to well below 2C would be gone.

Indeed, it would become very difficult to hold warming to less than 3C, leading to global temperatures that are likely to be highly dangerous and unseen on Earth for millions of years. So we must design policies that tackle congestion, air pollution and climate change together by, for instance, promoting better public transport and autonomous electric vehicles.

Our ability to feed and clothe both growing urban and rural populations depends crucially on protecting and conserving our oceans, forests, grasslands and soils.

The UN's Food and Agriculture Organisation estimates that annual food production will have to increase from 8.4bn tonnes today to 13.5bn

tonnes to provide for a projected population of 9.7 billion in 2050. Yet a third of the agricultural land around the world is already moderately to highly degraded due to soil erosion, salinisation, compaction, acidification and chemical pollution.

It is for this reason that the Global Commission on the Economy and Climate has called for the restoration of at least 500m hectares of degraded land (pdf) by 2030, and an end to the deforestation that has such devastating consequences for biodiversity and efforts to limit the rise of carbon dioxide levels in the atmosphere.

Reversing the destruction of productive land requires strong leadership and collective action by communities, businesses and governments.

For instance, in September, the Global Environment Facility will launch its new global programme, 'Taking deforestation out of commodity supply chains', led by the United Nations Development Programme, to increase the supply of, and demand for, sustainable beef, palm oil and soy in collaboration with national and regional governments in Brazil, Indonesia, Liberia and Paraguay.

The programme will work with existing platforms, such as the Tropical Forest Alliance 2020. The alliance already has 94 partners from the private sector, civil society and governments committed to reducing tropical deforestation related to key global commodities, including paper and pulp, by 2020.

It is developing better business models based on the understanding that sustainable land use and local economic prosperity can go hand in hand and generate significant opportunities for investment.

Meanwhile, the Global Agri-business Alliance is a groundbreaking initiative bringing together growers and traders, fertiliser and agro-chemical manufacturers, seed suppliers, primary processors and agri-tech suppliers to promote sustainable practices and to improve the resilience of farmers across the world.

Its membership already includes the chief executives of 40 companies across the world, all of whom are committed to helping the achievement of the sustainable development goals.

Beyond this, we need to find ways to mobilise global business to help finance action to protect our global commons. These are the kinds of partnerships that can deliver a more attractive form of economic growth and development, and preserve our global commons. They can deliver the sustainable development goals and the Paris Agreement on climate change, thereby bringing down poverty in our generation and creating an environment for sustainable growth and rising living standards for those who follow.



Give women credit and meet the global goals

MARY ELLEN ISKENDERIAN

President and CEO, Women's World Banking

If we are serious about achieving sustainable development, we must invest in women

Over the past 30 years, the world has seen unprecedented economic growth and a digital revolution that could help solve our most pressing social and environmental challenges. Yet despite this, our current model of development is deeply flawed, threatening our global sustainability.

Social inequality is worsening in many countries and inequality of economic opportunity—particularly for women—persists. On average women are still paid 25% less than men for comparable work and one billion women do not have access to formal financial services.

These inequalities are signs that business leaders have yet to embrace their role in building a more prosperous, secure, and sustainable world. The recent report, *Better Business, Better World*, by the Business and Sustainable Development Commission, on which I serve, offers a solution: set business strategy in line with the UN sustainable development goals, which provide a blueprint for global development that ends poverty, protects the planet and ensures universal prosperity. The commission estimates the economic “prize” for achieving these global goals at \$12tn (£9.5tn) by 2030.

The report offers a prescription for a new, socially and environmentally focused business model that can bring new resources and energy to parts of the global economy, previously left largely to public aid and thus ensure sustainable and inclusive growth. This can be a compelling growth strategy for individual businesses, especially in the financial services industry.

Financial inclusion is a cross-cutting theme critical to the success of all 17 of the global goals. Of the four global goals identified by the commission as hotspots of private sector opportunity, two—zero hunger (goal two) and good health and wellbeing (goal three)—have a major impact on the financial inclusion of women.

Globally only 10% of rural residents use credit and only half have access to a formal bank account. Women, who make up about half of the world's farmers, are even more excluded. Recognising this market opportunity, Women's World Banking worked with three institutions in Latin America—Banco Interfisa (Paraguay), Fundación delamujer (Colombia) and Caja Arequipa (Peru)—to develop rural lending products tailored to women's needs.

The institutions broadened their footprint in rural areas, and women clients grew their businesses and brought more security to their household finances. Together the three institutions reached more than 100,000 clients with loans; one more than doubled the percentage of women in its portfolio.

A recently completed study revealed that women who received this economic lifeline were also empowered in the rest of their lives, reporting stronger decision-making positions in their household.

Giving women access to meaningful financial services can also make a huge difference in health and wellbeing. Insurance can prevent

low-income families from falling deeper into poverty when health emergencies strike. Women in emerging markets represent an important untapped opportunity for insurers.

The IFC's SheforShield found that the value of health insurance premiums paid by women in these countries could grow from \$5bn today to \$29–46bn by 2030. Women's World Banking tapped this potential by developing Caregiver, a hospital micro-insurance product, with Microfund for Women (Jordan), with a specific focus on covering maternal health issues. We have since expanded it with partners in Peru, Morocco, Uganda and Egypt—reaching a total of nearly 1.5 million clients.

Women's financial inclusion also contributes to meeting the global goals in other ways. We know that when women have control over discretionary income, they spend it on their families, and particularly on their children's education—key to succeeding in goal four, quality education. And for the first time, we have evidence that financial inclusion helps eliminate poverty (goal one).

New research shows that M-Pesa mobile phone financial services have helped an estimated 186,000 households in Kenya—around 2% of the country's total population—to move out of poverty. The impact for women was even more pronounced. Women-headed households were twice as likely to be lifted out of poverty, and researchers also found that women shifted from subsistence farming to starting their own small businesses.

By setting business strategy in line with the global goals, financial service providers can tap into the economic prize of financial inclusion, opening up new markets and a source of revenue that is more sustainable, both for their business and for the planet.

Giving women access to meaningful financial services can also make a huge difference in health and wellbeing.



‘Business is on thin ice—as I found in an Antarctic crevasse’

KEITH TUFFLEY

Managing Partner and CEO, the B Team

Corporate champions are needed to save polar ice and the planet—and prosper in the process

Two months ago I had the good fortune of falling into a collapsing crevasse on the Antarctic ice cap while on an expedition from the Ross ice shelf to the south pole. Good fortune? Yes, because—apart from the fact that I survived—I had the experience of seeing first-hand the thickness of the ice covering the frozen continent.

I wouldn’t suggest that all business leaders should get such a head-down, bottom-up perspective of Antarctica. But there is something to be said for arguing that they do achieve some personal knowledge of the state of the world’s ice, and of the global commons in general. For companies will only be saved from destruction if they transform the way they operate. And business will only thrive if it creates the solutions for global problems for which it is primarily the cause.

As I hung in the crevasse, the massive chasm below me appeared endless, and no wonder: the average thickness of the ice sheet across the entire continent is over 3km. But it is melting—simply due to anthropogenic climate change. And, whether we know it not, we depend upon it.

The Antarctic continent is larger than the US, Europe or Australia, and its ice sheet contains 30m cubic kilometres of ice, around 90% of the world's freshwater. If all that melts, average sea levels will rise by around 70 metres; the Greenland ice sheet would add another seven metres. Of course, full melting of these ice sheets may take hundreds of years. But the latest research indicates that on current trends we should now expect it to be the main cause—supplemented by melting mountain glaciers and the expansion of warming ocean water—of a rise in sea levels of up to two metres over the next 75 years.

The Antarctic ice shelves, anywhere between 1–100 metres in thickness, that surround much of the continent are already melting rapidly. Since these ice shelves float on the sea surface, they do not directly increase sea levels. But the shelves do play a significant role in the speed at which the ice sheets melt, as they act as giant plugs that slow down the flow of glaciers into the warming ocean. And given that the ocean absorbs 93% of the heat that is being created by the burning of fossil fuels and other anthropogenic causes, the warming ocean is having a significant impact on these ice shelves.

Sea ice is also disappearing fast. It is at a historic low in the Antarctic while, in the Arctic, January 2017 marked the lowest sea ice extent since we began using satellites to monitor it 38 years ago.

All this ice plays a hugely important role in regulating the global climate. Polar ice reflects 80% of the sunlight that strikes it back into space, moderating global temperatures and keeping the polar regions cool. As we continue to lose it to rising temperatures—thereby exposing the land and sea which conversely absorb solar heat—the pace of climate change is expected to significantly increase. Already the polar regions are experiencing much higher temperature rises than the global average. The Antarctic Peninsula, for example, has seen a rise of 2.5C since the 1950s.

Preserving polar ice is everyone's—and every business'—concern. Unfortunately, human consciousness does not easily focus on what is happening in remote regions that few have the good fortune to visit, and hence it is too easy for us to ignore the implications of its melting ice. But they are important to all of us.

A two metre sea level rise over the next 75 years will be devastating for all people living on or near the coast. The hundreds of millions of people—both in developing and developed nations—who will become

climate refugees will affect everyone on earth. If we think we now have a refugee crisis, imagine what we will all face over this century as rising seas start to impact coastal communities across the globe.

Then there is the cost of protecting the built environment, and ultimately moving coastal cities and rebuilding roads, railway lines, and ports. These are resources that could otherwise be deployed to invest in education, public health and social welfare.

Melting polar ice will also impact regional and global weather patterns, ocean currents, and the sea-life that has become dependent on a stable climate. It is difficult to forecast an environment that civilised humanity has never experienced; but more unpredictability and instability should be expected in future global weather patterns. In the words of Julianne Stroeve, a sea ice researcher at University College London: "It's not just that we're talking about polar bears or seals. We all are ice-dependent species."

The only way to address this impending crisis is to transform our global economy to a net-zero greenhouse gas system by 2050. This is the target we must achieve to keep global temperatures well below 2C, something all countries have agreed to do through the Paris Agreement. This requires us to eliminate coal, oil and gas from our energy system and to address other emitters such as our agriculture and food system.

Business cannot thrive in a failed world where millions of climate refugees seek safety from rising sea levels and unpredictable weather. Business cannot be respected or trusted unless it addresses and takes responsibility for the pollution it generates that is melting our polar ice.

Fortunately, some forward-thinking companies recognise not just the problems, but the business opportunities in addressing our climate challenge. In a report released January 2017, the Business and Sustainable Development Commission estimated that meeting the sustainable development goals, many of which address climate change, could generate more than \$12tn (£9.6tn) in opportunities by 2030—equal to around 10% of forecast global growth.

We need many corporate champions to save our ice—and thus our precious planet and humanity itself. This is the private sector's moment in history to act, mobilise and bring solutions.



Climate change isn't fair

MARY ROBINSON

President, Mary Robinson Foundation—Climate Justice

Justice is key to protecting the global commons for future generation

In the face of the existential threat of climate change, the task of protecting future generations must start with ensuring fairness and equality in the current one. We are living through deeply troubling times—anxious about security, subjected to the shallow appeal of populism around the world and shifting towards increasingly myopic national policymaking in many countries. But for every regressive policy, for every small-minded comment demonising “the other”, we are witnessing communities coming together to deliver a different message.

Millions have taken to the streets to call for an end to the use of fossil fuels, respect of human rights and intergenerational equity. Around the world, university students are leading the charge calling for divestment from fossil fuels and investment in renewable energy services. People are becoming increasingly aware of their role as global citizens and the need to protect the global commons. We can see all around us an indomitable spirit of empathy and compassion that will not be cowed by cynicism or fear mongering. In this spirit, I recognise the emergence of a new wave of guardians for future generations.

When, like me, you have experienced the joy of becoming a grandparent you begin to think a lot more about the future. I have become very aware that world leaders and policymakers today are drafting decisions that will shape the world that my grandchildren, and their children, live in. And yet we afford little thought to how the

policies we make today will impact the world of 2050, when my youngest grandchild will not yet be 40.

We are custodians of our planet, a global commons that, by 2050, will be home to some 9 billion people. It is our duty to live in such a way that the precious, life sustaining environment which keeps us is passed to future generations in at least as healthy a state as we received it from those before us.

Today we are knowingly jeopardising the wellbeing of those future generations if we do not take action to achieve sustainable development. Without ambitious and sustained action to end poverty and tackle climate change, we are condemning them to an uncertain world, where the impacts of climate change exacerbate food and water insecurity, conflict, and the displacement of people from their homes and countries.

To tackle the common enemy of climate change we must view the challenge through a climate justice lens. Climate justice is the antithesis of the rise of populism and short-termism. Climate change confronts us with our global interdependence. Climate justice tells us that, in order to realise the right to development while avoiding the worst impacts of climate change, which means achieving the ultimate goal of the Paris Agreement—to hold the increase in the global average temperature to well below 2C above preindustrial levels and pursuing efforts to limit the temperature increase to 1.5C above preindustrial levels—world leaders must act in solidarity, motivated by an enlightened self-interest.

The solutions and national strategies that will ensure we stabilise our climate and pioneer new pathways to sustainable development will come out of a sense of empathy and fairness as much as by technical skills and expertise. The industrial revolution, the transition that ushered in the prosperity in which those in developed countries now live, left billions of people behind. Global inequality continues to worsen today.

Therefore, the challenge we face is not simply about leaving fossil fuels in the ground. In fact, weaning the industrialised world off them, though requiring great urgency, is perhaps the easier problem to solve. Avoiding the most devastating impacts of climate change, while eradicating poverty and enabling all people to enjoy the benefits of sustainable development, is the greater challenge.

In the face of this unprecedented challenge, the leadership demonstrated by so many developing countries is inspiring. Developing countries, small and large, grasp the urgency of the moment we are in and are working out how to transition to low carbon economies.

Fiji, serving as president of the climate negotiations this year, has confirmed its determination to become carbon neutral, and recently announced the creation of a future generations trust fund. Ethiopia aims to be middle-income, achieve ambitious greenhouse gas emissions reductions and invest in renewable energy by 2025, despite its backdrop as one of the world's poorest countries, with 74% of its population currently living without access to energy. Costa Rica is also transitioning to a low carbon economy—in 2016 it achieved 98% renewable energy. This leadership must be emulated around the world.

In his 1968 paper in Science, the Tragedy of the Commons, Garrett Hardin wrote, "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons." Today, we are faced with a dilemma. If we pursue national interests, if we close ourselves off from collaboration and unified action, the global commons will fall foul of the grim future that Hardin foresaw.

It is only by urgently and ambitiously pursuing a new paradigm of sustainable development for all people that we can ensure a safer future for those yet to be born. This is our obligation as guardians for future generations.

***We are knowingly
jeopardising the wellbeing
of future generations
if we do not take action.***



Why 2020 is a critical milestone for a climate-safe world

CHRISTIANA FIGUERES

Former executive secretary UNFCCC and convenor, Mission 2020

A game-changing opportunity to keep the promise of Paris

We are at a precarious point for the fate of the global commons. Our actions on climate protection over the next few years will determine whether we continue on a path of exponentially growing national disasters or pivot onto a path toward a safer, more prosperous world.

At the 2015 Paris summit, 194 countries committed to work collaboratively to limit the impact of global warming. Data shows that—if we are to achieve the Paris goals—we must reach a climate turning point in 2020 as the graph below shows.

This is critically important because the world community has also agreed to meet 17 sustainable development goals, or global goals, by 2030, including ending poverty and hunger, and ensuring universal access to affordable, reliable, sustainable and modern energy. If we are late to the 2020 milestone, and emissions have not begun a steady decline by then, we will all but eliminate our chance to stay within the range of a 1.5C to 2C temperature rise, beyond which the impacts we are seeing already—record Arctic ice melting, famine-inducing drought in Africa, unprecedented coral-reef bleaching at the Great Barrier Reef—are likely to worsen dramatically, threatening everyone, especially the most vulnerable. Missing the 2020 milestone would also put meeting all the global goals at risk. A

temperature rise that exceeds 2C would also make the world systemically uninsurable.

All this shows us that urgent action is necessary to meet the 2020 climate turning point.

It is also desirable; not just to avoid negative impacts from a rapidly warming world, but because the resulting health, energy and food security, and jobs - providing a basis for shared prosperity and financial stability - will benefit everybody.

The question then becomes: is the 2020 climate turning point achievable?

There are many arguments against it:

- In 2016, the Earth set a temperature record for the third year in a row, an ominous trend, which has unleashed remarkable physical changes to our planet that will last for centuries.
- Developing countries need much higher, and faster, investment now than is currently available so as to lock in clean energy infrastructure to meet their development agendas. Otherwise they will turn in the short-term to coal.
- There is significant inertia in the financial system, where externalities like carbon pollution are mostly not yet adequately priced in, and where short-term valuations still prevail.
- Finally, of course, there is politics, with some governments undoing climate-related policies and public funding drying up.
- But, as you might expect, I see many more arguments for the achievability of the 2020 turning point. This is because, in the end, all of our self-interests lie in wanting a stable, safe environment, where we can provide for our families without the threats of hunger, conflict or forced migration.
- The financial sector, recognizing the risks and opportunities, now has a series of recommendations—via the Taskforce for Climate-related Financial Disclosure—that will help investors stress test their portfolios against the 2C pathway. BlackRock—with over \$5tn

(£4tn) in assets—has warned companies it will vote out directors of companies that fail to address the risks posed to their businesses by climate change; and State Street Research has pointed to an industry-wide shift as investors discover sustainable value in environmental, social and governance based investing.

- We've just experienced the third year in a row where the world's carbon dioxide emissions have stayed flat while economic growth has continued.
- The pace of technological advances in renewables is enabling them to compete robustly, unsubsidized, with fossil fuels. The scale of their use is already comparable to nuclear.
- Battery storage and capacity, with better integration into the grid is improving exponentially. China is planning to put electric vehicles costing just \$8,000, without subsidy, on the road. And India is leading the charge by announcing ambitious plans to be a 100% electric vehicle country by 2030.
- There is broad participation and real leadership from the world's biggest businesses and investors in addressing climate change. Cities and states, and some nations, are already demonstrating ambitions on coal phase-outs, renewable energy and halting deforestation over and above the plans announced for Paris.
- There has been renewed determination over the Paris agreement in recent months rather than a falling back, with a galvanized environmental movement and successful interventions from indigenous communities worldwide as they work to protect their land and water from threats and degradation.

Whether we can achieve the 2020 turning point will depend on our ambition, our will-power in staying the course and on how we define the acronym BAU. We are no longer in a world of business as usual; we are now in business as urgent. We must be determined, and stubbornly foster innovative thinking and radical collaboration so that we reach the junction on time, together.

The 2020 turning point is already in sight. It's happening!

Join the conversation with the hashtag #2020DontBeLate



Cities must embrace nature to survive

ELIZABETH YEE

Vice-president, City Solutions, 100 Resilient Cities

Innovative, scalable solutions in cities can build resilience and defend the global commons

Ensuring the vitality of the global commons—the natural assets and ecosystems that form and sustain our world—has become urgent for planetary survival. Cities are poised to either accelerate the commons' demise, or to provide innovative, scalable solutions that can restore natural assets and the value they provide.

More than half of the world's population now lives in cities. By 2050, this will reach a staggering 70%, adding more than 3 billion people to urban centres. And more than 60% of mid-century metropolitan regions have yet to form. According to the World Economic Forum, \$3.7 trillion (£2.4tn) will be needed every year to 2050 to fund basic infrastructure. The actions cities take to build their own resilience to climate change, mass migration, and other major challenges of the 21st century, will have a fundamental impact on the rest of the world.

Building urban resilience requires an approach that cuts across different systems, with cities addressing their relationship with the natural environment as a critical part of strengthening themselves. Understanding the value of natural assets lies at the heart of any viable solution for protecting our commons.

Traditional models of conservation and regulation alone cannot catalyse the kind of systemic behavioural change that will renew our relationship with the environment, and return it to its central role in our affairs. We must design and implement strategies that articulate the benefits of nature—economically, socially and as a critical piece of building future resilience.

Through our work at 100 Resilient Cities (100RC), we have begun to see successful approaches that do just that—programmes and projects that incentivise investment in cultivating natural assets. From supporting environmentally friendly growth and sustainable waste management in Bangkok, Thailand, to identifying measures for coastal management and the protection of marine biodiversity in Byblos, Lebanon, cities are committing to defend the global commons as a natural way to create resilience.

El Paso, Texas, is balancing the tension between urban sprawl and the importance of maintaining its delicate desert ecosystem. Its office of resilience and sustainability collaborated with our partner, Earth Economics, to complete ecosystem service identification and valuation for a critical area near the Franklin mountains. Together, they are working to make the business case for preserving and responsibly developing land.

Just last month, Earth Economics also took part in a 100RC network exchange in Melbourne, Australia. Chief resilience officers representing the cities of Boulder and New Orleans in the US, Durban in South Africa and Semarang in Indonesia explored and developed

multi-benefit solutions that build urban resilience through biodiversity. They committed to bridging the gap between the need to value nature, and political and financial will in policy and capital investments.

The work of another 100RC partner—Arcadis, the Dutch engineering firm—reflects a growing trend to move away from traditional rigid barriers against flooding and sea level rise, and towards restoration projects that cultivate natural infrastructure. New York's Big U, also known as the Dryline—an Arcadis project done in collaboration with yet another 100RC partner, Rebuild by Design—combines flood protection with amenities that foster social cohesion and revitalise neighbourhoods.

Using berms creatively and relying on salt-tolerant trees and plants to build a resilient urban habitat, it is adding beautiful parks and public areas—unique to each location—in a 10 mile “U” around lower Manhattan. Such new landscapes provide natural infrastructure that is much more effective than traditional manmade structures in withstanding water. Rather than endlessly plugging proverbial holes in concrete walls, we can help nature synchronise with such economic needs.

If they are to build meaningful resilience, cities must develop solutions for the entire urban ecosystem. This requires articulating the value of natural assets and their essential role in ensuring we not only survive but thrive amid the challenges of the 21st century. Only by making them intrinsic to economic, social and political solutions in our cities will we be able to save the global commons and endure as a society.

Climate action needs green, not just red lights

DANIEL C ESTY

Hillhouse professor of environmental law and policy, Yale University; co-author, Green to Gold

Incentives for reducing emissions work better than old-style regulatory approaches

In the twentieth century environmental protection centred on national government regulations and standards, often requiring emitters to install mandated pollution control equipment. This approach delivered some gains: across Europe and North America, the air is now much cleaner and rivers, streams, and lakes are less polluted. But such “command and control” regulation has not delivered much progress on some other big issues endangering the global commons, including climate change.

Despite more than two decades of the 1992 UN Framework Convention on Climate Change, emissions have continued to rise—threatening to produce global warming, rising sea levels, more frequent and intense hurricanes, changed rainfall patterns, more floods and droughts, and diminished farm productivity in many places. This failure can be traced to structural flaws in the past global response to climate change.

The 20th century regulatory model, on which the 1992 treaty builds, makes what could be called the “lawyer’s mistake” of assuming it is enough to pass a law, draft regulations, or sign an international agreement. Telling people, particularly in the corporate world, what not to do is insufficient. What is really needed is a framework of incentives that changes behaviour and induces innovation to solve problems.

If we are successfully to address the build-up of greenhouse gases in the atmosphere, and many other persistent environmental challenges, we need to move from a regulatory structure that depends on red lights and stop signs to one that also presents green lights.

These incentives to spur action and investment will signal to business leaders and creative minds where to devote time and resources, promising a marketplace return for breakthrough technologies and other innovations that address priorities in public policy. We must make clear to entrepreneurs and investors that efforts to bring forward a clean energy future and other cleantech advances will be rewarded with financial success.

Fortunately, the 2015 Paris climate agreement includes steps toward a world of green lights, with an array of 21st century regulatory tools that will help spur innovation and deliver better policy results. Its negotiators drew on ideas put forward not just by national governments but by mayors, governors, premiers, and corporate leaders. And cities, states, provinces, and companies are all poised to follow through on its commitments—representing a major break with past reliance on national governments.

In fact, presidents and prime ministers have relatively little control over their societies’ carbon footprints. Subnational government leaders and business executives have much more day-to-day influence over transit systems, economic development, building construction, infrastructure investments, and decisions about what products get produced, and how.

The relentless pushes by Paris mayor Anne Hidalgo—who chairs C40, the cities’ group that has mobilised action among mayors of 90 of the world’s biggest urban centres—and by former California governor Arnold Schwarzenegger—who launched the R20 group that has galvanised state and provincial climate change projects—demonstrate a depth of commitment on the ground that was missing from past global efforts.

The Paris agreement also leaves each country to establish its own regulatory programmes and strategies to reduce emissions, providing room for fresh thinking and new policy tools. Indeed, many of the nationally determined contributions that have been put forward reflect the trend away from command and control regulations toward economic drivers such as emissions allowance trading systems and carbon pricing. Such market mechanisms provide much clearer incentives for investment in renewable power, energy efficiency, smart grids, and other clean energy systems.

More than 1,200 companies have aligned with the World Bank’s Carbon Pricing Leadership Coalition to explore ways of using price signals to shift their internal energy decision making towards a decarbonised future. Even universities are adopting carbon pricing to change behaviour. At Yale, a \$40 (£31) per tonne carbon charge has induced significant shifts in building design and energy management practices.

Business leaders across the world are developing pathways to a clean energy future. Bill Gates and his fellow billionaire backers of the Energy Breakthrough Coalition have committed \$2bn to drive innovation across a spectrum of technologies that might change the energy foundations of our economy.

Companies such as HSBC, Areva, Engie, Enel, and Tata have joined a solar power alliance launched by French president Francois Hollande and Indian prime minister Narendra Modi to expand access to clean electricity in developing world villages. While business was seen as the enemy of environmental progress in the 20th century, today’s policy frameworks seek to engage it as a critical engine of innovation.

Similarly, the Paris agreement moves away from the reliance on government subsidies of past global efforts to fund investments in

climate change action. It seeks instead to use limited public resources to leverage private capital through green banks, green bonds, and other creative financial instruments.

This shift has already begun to pay dividends. Connecticut’s Green Bank has increased the state’s deployment of energy efficiency and renewable power projects more than 10-fold. Britain, Malaysia, New York and other jurisdictions have similar mechanisms, while more than \$90bn of green bonds were placed last year.

Finally, opportunities abound to use information technologies to sharpen incentives for solving problems that hinder environmental advances and a sustainable future. Harnessing computer power and modern communications tools makes it much easier to track emissions, charge for pollution damage, identify successful policy strategies, disseminate technology breakthroughs, benchmark government and business greenhouse gas control efforts, celebrate leaders, spur on laggards, and highlight best practices.

Though the Paris agreement lacks binding obligations and enforcement mechanisms, it does provide for evaluation and reporting on results every five years. It also demands increased commitments if progress falls short of what will be required to stem the build-up of greenhouse gases in the atmosphere.

Thus, while worries about weakening resolve over climate change in some national governments are real, there are parallel reasons for optimism. The Paris agreement—with its commitment to multi-tier governance and its engagement of mayors, governors, corporate executives, and NGO leaders—promises to be much more robust than the global community’s past efforts.

Deploying 21st century sustainability strategies and broad-based incentives for innovation relies much less on action by any one set of governments. It is thus much more likely that the world has reached an inflection point on climate change.

*For more information, read Esty’s recent article, [Red Lights to Green Lights: From 21st Century Environmental Regulation to 21st Century Sustainability](#), in *Environmental Law* (April 2017).*





About the GEF

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental problems. Since then, the GEF has provided \$14.6 billion in grants and mobilized an additional \$74.3 billion in financing for more than 4,000 projects. Today, the GEF is an international partnership of 183 countries, international institutions, civil society organizations and the private sector that addresses global environmental issues.

The GEF's 18 implementing partners are Asian Development Bank (ADB), African Development Bank (AfDB), Development Bank of Latin America (CAF), Conservation International (CI), Development Bank of Southern Africa (DBSA), European Bank for Reconstruction and Development (EBRD), Foreign Economic Cooperation Office—Ministry of Environmental Protection of China (FECO), Food and Agriculture Organization of the United Nations (FAO), Fundo Brasileiro para a Biodiversidade (FUNBIO), Inter-American Development Bank (IDB), International Fund for Agricultural Development (IFAD), International Union for Conservation of Nature (IUCN), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Industrial Development Organization (UNIDO), West African Development Bank (BOAD), World Bank Group (WBG) and World Wildlife Fund U.S. (WWF-US).

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