Proceedings of 2012 Blue Planet Prize Commemorative Lectures

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THE ASAHI GLASS FOUNDATION

CONTENTS

Professor William E. Rees (CANADA)

Professor, University of British Columbia,

FRSC (Fellow of the royal Society of Canada)

Dr. Mathis Wackernagel (Switzerland)

President, Global Footprint Network

Selection rationale: Developing and advancing the Ecological Footprint, a comprehensive accounting system for comparing human demand on ecosystems to ecosystems' capacity to self-renew. Their approach measures human carrying capacity and helps assess the risks of overconsumption to planetary stability.

Professor William E. Rees

Education and Academic and Professional Activities

1943	Born in Canada
1966	Graduated from the Department of Zoology, University of Toronto (Canada)
1969	Assistant professor, University of British Columbia (Canada)
1973	Received Ph.D. from the University of Toronto (Ecology and Ethology)
1976	Associate professor, University of British Columbia
1988-90	Founding Member, City of Vancouver Task Force on Atmospheric Change
1990	Professor, University of British Columbia
1994	Founding member, Canadian Society for Ecological Economics
1994-1999	Director, School of Community and Regional Planning (SCARP)
1997-1999	President, Canadian Society for Ecological Economics
2006 -	Founding member, One Earth Initiative (now a continuing Fellow and Member, Board of Directors), Fellow, Post Carbon Institute
2007-2009	Director, Centre for Human Settlements

Major Awards Received

1997	Killam Research Prize
2005	City of Barcelona 2004 Award (Multimedia Category) for the exhibition *Inhabiting the World* (10 February 2005) as member of winning team
2006 -	Fellow of the Royal Society of Canada (FRSC)
2007-2010	Pierre Elliott Trudeau Fellowship and Prize
2012	Honorary Doctorate, Laval University, Québec, (Canada)
	No 13 in the global (En)Rich List – top inspirational individuals whose contributions enrich paths to sustainable futures
	Kenneth Boulding Memorial Award in Ecological economics (jointly with Dr Mathis Wackernagel)

Dr. Mathis Wackernagel

Education and Academic and Professional Activities

1962	Born in Switzerland
1987	Graduated from the Swiss Federal Institute of Technology in Mechanical Engineering
1994	Received Ph.D. from The University of British Columbia (Canada) in Community and Regional Planning
1995-2001	Coordinator, Centre for Sustainability Studies, Anáhuac University, Xalapa (Mexico)

1999-2003 Director, Indicators Program at Redefining Progress (San Francisco)

2003 onwards Co-Founder and President, Global Footprint Network (with Susan Burns) (Oakland, USA; Brussels, Belgium; Geneva, Switzerland)

2011 onwards Guest professor, Cornell University

Major Awards Received

2005 Herman Daly Award (Society for Ecological Economics)

2006 World Wide Fund for Nature Award for achievements in environmental conservation

2007 Skoll Award for Social Entrepreneurship (with Susan Burns);Honorary Doctorate, University of Bern

2008 Gulbenkian International Award (with Global Footprint Network)

2011 Zayed International Prize for the Environment

2012 No 19 in the global (En)Rich List – top inspirational individuals whose contributions enrich paths to sustainable futures

Kenneth Boulding Memorial Award in Ecological Economics (jointly with Dr William Rees)

William Rees and Mathis Wackernagel are the co-developers of Ecological Footprint analysis, a resource accounting framework for determining human demands for biophysical productivity (biocapacity) relative to the regenerative capacity of ecosystems. They produced the first extensive regional application of the method as part of their participation in the University of British Columbia's Task Force on Healthy and Sustainable Communities—of which Professor Rees was co-Chair—in the early 1990s. (This research program provided the case study for Wackernagel's doctoral dissertation.)

Rees has been continuously involved in refining and applying Ecological Footprint analysis to sustainability analysis throughout most his career at that university. Various graduate students under his tutelage have used integrated material flows analysis and Ecological Footprint analysis to assess the impacts of cities, countries, and numerous individual economic activities from greenhouse vegetable production, through net-pen salmon farming and air transportation to global trade, and have subsequently gone on to establish outstanding academic careers. His current students continue to apply and refine Ecological Footprint analysis in studies of both urban sustainability/vulnerability and the negative biophysical implications of globalization. Prof. Rees has authored or co-authored hundreds of scientific papers, book chapters, and popular articles on Ecological Footprint analysis, human carrying capacity, and related topics. He has lectured by invitation on areas of his expertise in 30 countries around the world. From 1994 to 1999 he served as Director of the School of Community and Regional Planning and led the reorientation of the School's mission statement and curriculum in support of 'planning for sustainability'. He is also a policy and science advisor to Global Footprint Network since its inception in 2003, and has actively supported Global Footprint Network in leading a worldwide effort to make the Footprint an ever-more robust measure of human demand on the biosphere.

Wackernagel completed his Ph.D. research, developing the Ecological Footprint, under Professor Rees in 1994. He then worked in Costa Rica with Maurice Strong's Earth Council and shortly after initiated a centre on sustainability studies at Anáhuac University in Xalapa (Mexico), where he furthered Footprint research. There, in 1997, he for the first time consistently calculated the Footprint and biocapacity for 52 countries using UN data sets. His research attracted a great deal of attention at the Rio+5 Conference in Rio. From 1999 to 2003, Wackernagel was the sustainability director of Redefining Progress, an economic think-tank in California. This experience encouraged him to co-found Global Footprint Network with Susan Burns in 2003 with the goal of raising the profile of Ecological Footprint analysis and making

ecological limits central to decision-making. The Network has quickly grown into a major non-governmental organization with offices in Brussels (Belgium) and Geneva (Switzerland), in addition to its California headquarters. In 2012, it was identified as one of the top 100 NGOs in the world.

For the last 10 years, Wackernagel has contributed to WWF's bi-annual flagship publication "The Living Planet Report" which has become a key publication for Ecological Footprint results. The 2012 edition was released in May from the International Space Station, generating the largest media response of any Living Planet Report so far. The latest Global Footprint Network calculations show that humanity's demand for bio-resources exceeds the long-term regenerative capacity of Earth by over 50 percent.

Significance of impact

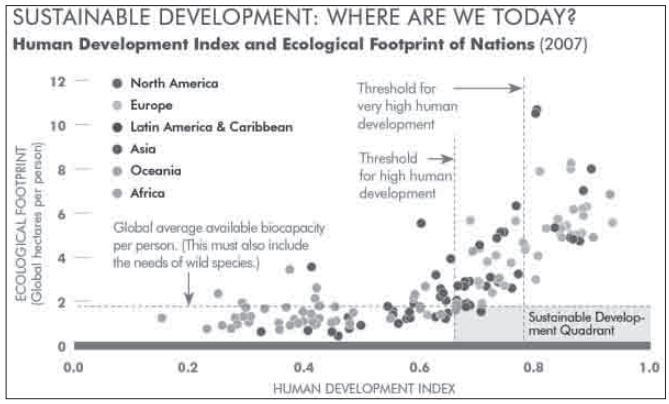
Ecological Footprint accounts enable, for the first time, systematic comparisons of human demand on nature to available supplies of nature's goods and services (i.e., biocapacity). The method can be applied to any population at regional, national or global scales. [1]Ecological Footprint analysts measure both demand and supply in terms of hectares of global average productivity. Hence, a population's Ecological Footprint is *the area of productive land and water ecosystems required, on a continuous basis, to produce the bio-resources that the population consumes and to assimilate its wastes, using prevailing technology*. One significant waste flow is the carbon dioxide from fossil fuel burning. Biocapacity is the productive ecosystem area that exists – in the world or in a region.

The Ecological Footprint is inversely related to carrying capacity: while traditional carrying capacity would ask "how many people could this area support at a specified material standard of living", Ecological Footprint analysis asks "how much area (biocapacity) is required to support this population *wherever on earth the relevant land and water ecosystems may be located.*" This approach accounts for both trade flows and reflects technological sophistication for the time that is being analyzed. As noted, Ecological Footprint analysis enables scientific determination of whether prevailing levels of bio-resource consumption by the particular population (or the entire human enterprise) exceed the long-term productive capacity of supportive ecosystems. In other words, it can reveal whether the population exceeds the carrying capacity of its domestic territory and other ecosystems at its disposal.

Because Ecological Footprint analysis has such serious implications for global development, both the general concept and specific features of the method have long been the subject of discussion and controversy in various academic journals and meetings around the world. For example, *Ecological Economics*, the official journal of the International Society for Ecological Economics, frequently publishes articles and book reviews on Ecological Footprint analysis and has run at least two special fora dedicated to debating the concept. Also the Stiglitz-Sen-Fitoussi commission of French President Sarkozy dedicated 15 pages of its report discussing and evaluating the Footprint.

The influence of Ecological Footprint analysis has, of course, spread far beyond the academic ivory tower. Because Ecological Footprint analysis represents human environmental demands in terms of personal consumption and a corresponding two-dimensional area of land and water, it is easy for the general public to relate to and understand. This has facilitated the application of the method around the world in numerous projects at a variety of spatial scales. In particular, the conceptual simplicity of Ecological Footprint analysis contributes to an increasing appreciation of the impossibility of sustaining ever-increasing material consumption on a finite planet. The notion that there may be biophysical limits to material growth is finally beginning to resonate with governments, international agencies and development-oriented NGOs alike, as it has serious implications for everyone, from the lowest income communities to the

[1] Ecological Footprint analysis can also be adapted to assess the ecological "load" imposed by specific economic activities, industries, or sectors.



Global sustainable development can be assessed by tracking development (or human wellbeing) and sustainability (does it fit within the means of one planet?). These two dimensions can be measured using UNDP's Human Development Index (HDI) as an indicator of human development, and the Ecological Footprint as a measure of human demand on the biosphere. An Ecological Footprint less than 1.8 global hectares per person makes those resource demands globally replicable. Despite growing adoption of sustainable development as an explicit policy goal, most countries do not meet both minimum requirements. Since every country contains different amounts of biocapacity, this analysis can also be adapted to each country. Also note that the world as a whole is outside the Sustainable Development quadrant.

highest net-worth individuals.

It follows that the Ecological Footprint enjoys a special role as a tool in environmental education. Many public and high-school text books feature chapters or illustrations of the method. Students and the general public can also make use of an on-line personal Footprint calculator, (originally produced for Earth Day Network), which is visited by over one million people per year.

Lagging behind the public, government agencies are now beginning to pay serious attention to Ecological Footprint analysis. As previously noted, numerous national governments have commissioned reviews to test the Footprint concept and at least seven, including the United Arab Emirates, Ecuador, Switzerland, Japan, Indonesia and Latvia, have incorporated the Footprint assessment into some of their policies.

Awareness of the Ecological Footprint is certainly spreading within the Japanese government. (Dr. Yoshihiko Wada, a colleague of Wackernagel and Ph.D. student of Rees, has been an active promoter of the concept in Japan and beyond). WWF Japan has published a prominent Ecological Footprint report. There is an Ecological Footprint Japan society. The Japanese Ministry of the Environment shows research results and policy agreements concerning Ecological Footprints in the 1996, 1999, 2001 and 2002 editions of its *Annual Report on the Environment (review);* since September 2000, Ecological Footprint specialists have taken part in a meeting for discussing procedures for trade liberalization and environmental impact assessment, held within the Ministry of the Environment; Ecological Footprint analysis is also cited in the environmental white paper of the Tokyo metropolitan government.

The Ecological Footprint also played a prominent role in the "Beyond GDP" initiative of the European Commission. During the conference in 2007, the commissioners mentioned only three progress measures by name: GDP, Human Development Index, and the Ecological Footprint.

But the Footprint is cited many more international fora, including in the Environmental Commission's report on the North American Free Trade Agreement (NAFTA) and in various United Nations agencies' reports. For instance, UNDP's *Human Development Report* is listing the Footprint as an indicator – as well as The Economist's *Pocket World in Figures*. Also the Convention on Biological Diversity proposes the Footprint as a biodiversity indicator – with plenty of documents on their site pointing to the Footprint.

The Ecological Footprint concept, developed by Drs. William E. Rees and Mathis Wackernagel, continues to gain popularity, momentum and credibility with sustainability analysts everywhere. Of course there is also sometimes resistance on the path, that's part of the program and an indication that the approach challenges people's thinking. Empirical observations on everything from climate change to fisheries collapse confirm daily the reality of the resource limitations and overshoot that have long been highlighted by Ecological Footprint analysis. And a comprehensive approach as proposed by the Footprint help people to make sense out of the complexity and guide action that truly resolve problems, rather than shifting them from one issue to the next.

There is little question that the method has succeeded in helping to re-open the debate on human carrying capacity. The stage is set for a renewed effort by the Global Footprint Network to convince ever more countries to adopt the Ecological Footprint as a key measure of well-being and sustainability. Data for Ecological Footprint assessment may well become as central to nations' national accounting systems as economic data are for GDP calculations today.

Reconstructing the Premise: Entering the Global Auction

Dr. Mathis Wackernagel

Slide 1 -

Humanity's growing resource hunger has moved us into global overshoot. Yet so many people in the world are deprived and lack opportunities for a dignified life. This spectacular double-challenge is confronting us – and there is little evidence that our past efforts have been sufficient in redirecting our destiny onto a sustainable path.

You recognize the dilemma. Thank you for putting it front and centre. This wonderful prize is truly a gift to a larger community, including many dedicated individuals at Global Footprint Network and its partner organizations across the globe, the indispensible community of funders, supporters, teachers, enablers, and all the others who have dedicated themselves to the most fundamental, and so utterly necessary, dream of flourishing lives for all on our great blue Planet.

I will use this generous opportunity to speak to you for exploring just one question: why are resource limits now undermining economic performance?

Slide 2 -
I think like a farmer.
This is how the world looks like from a farming perspective.

Let me start 50 years ago – just about when I was born. This map for **1961** shows that most countries were true farms – they had more biocapacity than their residents consumed. They were ecological creditors. Resources were not constraining economies. There seemed to be plenty.

Residents of ecological creditor countries consume on average less resources than their countries' ecosystems can regenerate (the darker the green the higher the ratio). Note: since there is trade among all countries, both demand and supply are calculated from the perspective of net imports (or net exports).

Ecological debtor countries are in the opposite situation. They run a biocapacity deficit. They use, in net terms, more than what their countries' ecosystems can renew.

FURTHER EXPLANATIONS:

• Ecological Creditors: Residents of ecological creditor countries use less ecological services than are available within their national borders, and therefore are endowed with a reserve of natural assets. This reserve, in an increasingly resource-constrained world, give those countries an economic advantage and strengthens their strategic positions.

• Ecological Debtors: In contrast, countries with ecological deficits depend on net imports of such resources or on liquidating their ecological assets. Both are an economic drain on those countries.

Slide 3 -

This has fundamentally changed. We have entered a new era of "biocapacity constraints."

With global overshoot, and rapidly increasing resource costs since 2000, the situation has shifted. As a whole, humanity's resource demand now exceeds the planet's supply by over 50 percent (2008 data). This ecological deficit means that it took a year and six months to regenerate what humanity used in 2008.

As global overshoot increases, the gap between ecological creditors – countries that have more biocapacity than they use – and ecological debtors – those using more biocapacity than they have – is becoming more pronounced, and is turning into an economically more and more significant divide. Today, 83 percent of the world's people live in countries that run an ecological deficit.

As a result, Global Footprint Network focuses on the economically ever more acute Ecological Creditors and Debtors dilemma since it makes obvious the self-interest of countries to react to biocapacity constraints.

"We are not facing a 'global problem' but a 'global storm'. The question is: is your 'boat' ready? In a world of resource constrained world, can you, as a country, afford to run an ecological deficit? Can you afford 'not to fix your boat'?"

Slide 4 -

How do we know? By using Ecological Footprint accounting

The Ecological Footprint is the area of land and water it takes for a human population to generate the renewable resources they consume and degrade the waste it produces in a given technological context. In other words, it measures the "quantity of nature" that we use, and compares it with how much we have (biocapacity). This accounting supports decision makers when it comes to making difficult choices, managing conflicts of objectives and placing themselves in an optimal situation for the future. The accounts can be applied to the global, country, region, individual or product.

Cropland: Cropland is the most bioproductive of all the land-use types and consists of areas used to produce food and fiber for human consumption, feed for livestock, oil crops, and rubber. Due to lack of globally consistent data sets, current cropland Footprint calculations do not yet take into account the extent to which farming techniques or unsustainable agricultural practices may cause long-term degradation of soil. The cropland Footprint includes crop products allocated to livestock and aquaculture feed mixes, and those used for fibers and materials.

Forest land: The forest Footprint is calculated based on the amount of lumber, pulp, timber products, and fuel wood consumed by a country on a yearly basis.

Grazing land: Grazing land is used to raise livestock for meat, dairy, hide, and wool products. The grazing land Footprint is calculated by comparing the amount of livestock feed available in a country with the amount of feed required for all livestock in that year, with the remainder of feed demand assumed to come from grazing land.

Carbon Footprint: Carbon dioxide emissions from burning fossil fuels are currently the only waste product included in the National Footprint Accounts. The carbon Footprint includes embodied carbon in imported goods. The carbon Footprint component of the Ecological Footprint is calculated as the amount of forest land needed to

absorb these carbon dioxide emissions. Currently, it is the largest portion of humanity's Footprint.
Fishing grounds: The fishing grounds Footprint is calculated based on estimates of the maximum sustainable catch for a variety of fish species. These sustainable catch estimates are converted into an equivalent mass of primary production based on the various species' trophic levels. This estimate of maximum harvestable primary production is then divided amongst the continental shelf areas of the world. Fish caught and used in aquaculture feed mixes are included.
Built-up land: The built-up land Footprint is calculated based on the area of land covered by human infrastructure — transportation, housing, industrial structures, and reservoirs for hydropower. Built-up land may occupy what would previously have been cropland.

Slide 5 -

Let me simplify.

Perhaps there is no global problem. Perhaps there is merely a huge global storm. Getting stronger and stronger, and we are sitting in many different boats – countries or cities.

Each one is facing the storm. Some boats are better prepared, others are larger etc.

Slide 6 -

We are all sitting in our own boat. Many of our boats have severe holes.

There is no advantage in waiting for all others to agree first to fix their own boat.

What are we waiting for? Maybe we are waiting to get rescued? Good luck!

Slide 7 -

If nobody else is fixing their boat, it is even more important to fix our own boat, since there is no other boat to go to.

Every boat is in a distinct situation, as we will see. We are not just subject to one global fate. There are global threats (such as global climate change), but it matters to understand how we are prepared and positioned as a country or city.

Here's the good news: All countries can win, but only if they turn their own fate around. Look at your resource trends. Don't wait for others.

That's why Global Footprint Network works directly with national governments.

Slide 8 -

Let's look at some of these boats – all boats I had the privilege of visiting over the last two months.

Colombia – a country that's finding its strength again, with still quite significant amounts of biocapacity –

but losing out rapidly on a per capita basis.

I am just back from discussing with the Central Bank of Colombia, where we are exploring a collaboration on revisiting Colombia's competitiveness in a resource constrained world.

Slide 9 -

Ecuador – the first country to make biocapacity deficit reduction a national policy goal.

The most biologically diverse country in the world, Ecuador's ecological wealth once vastly exceeded what its population used to support its activities. Today, that surplus has all but disappeared, and the country's Ecological Footprint is almost equal to its biocapacity. That is why, in 2009, Ecuador launched a program to keep its country in the ecological black. In its National Development Plan, the government has committed that it will not let Footprint exceed biocapacity, even as its population size and standard of living grow.

This trend is not a reflection of "Global Footprint Network being against the right to develop". Quite the contrary. It is a commitment to development, but the presented trends are a commitment to collapse.

In Ecuador, we now have a formal agreement with the ministry of environment, but also work with the ministry of planning, and ministry of tourism. Next week, we will be hosting a delegation of the government at our offices in California.

Slide 10 -

Turkey – It is a country that has only more recently entered the club of biocapacity debtors.

One month ago, I was in Ankara, visiting the ministries of development, finance and environment. This follows a Footprint report for Turkey which was published earlier this year through WWF.

Slide 11 -

Japan has been running a deficit for some time.

While it has contained the expansion of the deficit, the risk exposure is growing because the world is in ever larger deficit, and because the costs of resources have been increasing.

Japan was one of the first countries engaging in a research collaboration with Global Footprint Network. Also WWF has launched two reports on the Footprint, one just a few days ago.

Slide 12 -

Italy – has continued to rapidly increase its deficit

Italy's media, particularly its most prestigious newspapers, have been actively reporting on the Footprint. A month ago, we had a workshop with UNESCO in Venice bringing together representatives from over 12 countries

from the Mediterranean region. We launched our Mediterranean report showing the rapidly tightening resource situation for most countries in that region. Let me give you a deeper look at that country:

Since 1961 (when UN records started to become more consistent across nations), Italy has been in a biocapacity deficit situation. The average Italian has demanded more resources than can be renewably generated within the borders of Italy. In 1961, Italy had a per capita biocapacity deficit of 0.9 global hectares, meaning that Italians were in essence using 1.8 Italies. By 2008 this deficit had grown to 3.4 global hectares, which was the equivalent of using an additional three Italies.

The next slide shows what this biocapacity deficit is made up of.

Slide 13 -
Biocapacity Deficit Breakdown for Italy

Italy's biocapacity deficit can be disaggregated into the individual land use type components that make up the Footprint. The majority of this deficit has been driven by the carbon Footprint, but the cropland and forest land deficits have also been growing in the last few decades.

This biocapacity deficit is due to three main causes: 1) Importing resources from external sources, 2) Degrading domestic biocapacity and 3) Placing pressure on the global commons, for example for carbon sequestration.

Such a deficit is not sustainable as humanity's demands on the planet are already requiring the resource supply equivalent to 1.5 planets. As such, many countries find themselves in a biocapacity deficit situation and are becoming more and more reliant on external sourcing to meet the demands of their residents.

What are the economic implications? Up to the year 2000, resource and commodity prices went down faster (according to World Bank pink sheet) than Italy's biocapacity deficit went up. Hence the net costs for Italy did not increase. The growing biocapacity deficit for Italy did not seem to be a problem. **But this has changed since 2000**. Resource costs have nearly tripled. Therefore, the costs for Italy are rising -- more precisely, the costs for resources Italy must import to make up for its own ecological deficit.

Slide 14 -

Global Footprint Network can calculate the net resource costs for Italy over time – and it shows a level of costs that even rapid economic expansion cannot overcome.

Essentially it is amounts times prices.

Recently, the resource costs have been growing so rapidly that Italy has not been able to compensate these rising costs through other means.

This financial pressure enticed Italy into financial deficit spending. It thereby can overcome the economic

stress in the short-run, but it is leading to a financial debt crisis in the medium-run.

Changes in costs – in the order of percentage points of GDP – are material and significant for economic performances. If resource costs increase by just one percentage point of GDP, this may actually slow down economic performance by more than one percentage point of GDP because of multiplier effects. Money leaving the economy does not recirculate in the economy.

Is Italy alone? See next slide, which compares several European countries.

Slide 15 -

Italy is not alone – here are 24 European countries compared *(Source: Global Footprint Network, National Footprint Accounts edition 2008 (1961- 2005). Note: newer data are now available).*

Why the Euro Crisis has been in the making for a while:

Here are 24 European countries, 19 of which are part of the European Union. All results are presented in PER CAPITA terms - on the same time scale, but the y-axis is different. Y-axis is adjusted to better show each country's historical path.

All 24 countries have their own paths. There are some similarities; for instance, many European countries run significant biocapacity deficits.

What is striking is that Spain, Greece, Italy and Portugal show quite similar dynamics: rapid increase of their biocapacity deficit over time. Combined with economic analysis, it becomes clear that this trend caused significant, and rapidly rising cost pressures on those four countries, making them more vulnerable than other countries to economic fragility.

Using Global Footprint Network data (including the cost analysis), it becomes quite obvious, that the Euro crisis in Southern Europe cannot be divorced from the resource performance of those countries.

Slide 16 -

The question is simple:

What happens when an infinite growth economy runs into a finite planet?

Slide 17 -

Debt boils over

One of the hidden drivers behind Europe's financial turmoil is the dramatic increase in resource prices over the last 10 years. Historically, cheap resources have helped fuel economic growth, but the situation has now changed. Increasing costs impose a burden on economic performance that is often reflected in rising debt levels. This, at a time when the ability of many countries to service this debt is being called into question.

Slide 18 -
The majority is left out.

As prices rise, many countries must spend larger portions of their budgets on essential resources from abroad, often forgoing expenditures on health, education, infrastructure or other productive capacity building. People find it more difficult to make ends meet. The socio-economic impact of ecological overshoot, including climate change, disproportionately affects the most vulnerable.

Slide 19 -
Biodiversity is for sale.

The threats facing plant and animal life on the planet are greater than at any time in recorded history. Human pressure in the form of overharvesting and habitat loss is driving down wildlife populations worldwide. In our economic system, wild species have little value. As long as trees, for example, are worth more cut than they are standing, the pressures to liquidate natural resources will be overwhelming.

Slide 20 -
Food turns into a luxury.

Soil erosion, rising fertilizer prices, and severe weather brought on by climate change have all contributed to the volatility of crop yields and food prices. This is particularly harsh in countries where most people depend on basic foods, such as unrefined grains and rice,

which are more directly linked to global commodity prices than are the refined foods found in supermarkets.

We are entering a new dynamic.

We call this new dynamic the global auction.

Let me explain

Slide 21 -
What to track in a resource-constrained world?

What is the situation of various countries around the world?

Let’s start with the traditional view – and the traditionally most prominent performance indicator: income. (GDP, or better GNI , being an approximation)

Y- AXIS: One key performance indicator is income. How much income are economies able to generate in a given year? Income is seen as a proxy for the potential to resolve any problem. More income opens more options. GDP (or GNI) is an approximation of how much income people are able to generate, on average, within an economy.

(Note, GDP does not indicate how much income the country can produce in the future – it does not distinguish between regenerated income, and income from liquidation).
X- AXIS: In a resource-constrained world, resource performance is becoming another key indicator. Here the X-Axis tracks whether a country is in an ecological creditor or debtor situation.

Now let's populate the graph with data. Not just for one year, but looking at trends.

Slide 22 -
How have countries performed over the last 30 years?

This graph shows absolute income and an increase in biocapacity deficits of countries. For most countries, their income (measured in purchasing power adjusted income per capita or -ppp) has increased. At the same time, their biocapacity deficit has increased (or countries' biocapacity reserves have shrunk). (Note: The arrows stretch over a 27-year period – also note that 1.8 global hectares per person is the amount of biocapacity available per person in the world, or about as much as many featured countries have lost per person over this 27-year time span).

Many might interpret this graph as a sign that countries' residents have been able to increase their household consumption – as economies have used more resources. Is a growing biocapacity deficit just an unfortunate cost of business? Others may interpret that the growing biocapacity deficits may call in question these countries' abilities to expand their economies in the future. Maybe, larger biocapacity deficits is an unfortunate, but possibly necessary, part of doing business. This biocapacity deficit does not seem to impact the countries' income either. It may be seen as lamentable, but not fundamentally linked to economic performance. **Overall, this graph may give the (misleading) impression that it is inconclusive whether resource dimensions have anything to do with whether countries are on a fundamentally positive or negative track.** *Data source: Income data from the World Bank ; Biocapacity deficit from Global Footprint Network.*

But are we looking at this from the right angle?

Which World Are We in? Are we really in a **"factory world"**? A world of unlimited resources? In such a world, additional demand will stimulate additional supply. If more books and chairs are purchased, more books and chairs are produced. The limit to supply is demand. All that matters is your absolute income – more income will give you access to more products and services. But the world we are in is **a different world…**

Slide 23 -
From *"factory world"* to a *"global auction"*

If we assume that we are in a world of resource limitations (as indicated by growing global overshoot), with all countries wanting more and more from the globally limited resource stock, then the "game we are in" can be more likened to a **global auction** of finite goods. In such an auction, what matters is not absolute ability to pay, but the relative ability compared to all the other bidding power in the auction room.

Therefore, we need to track relative income (What percentage share does an American get from the total

global pie?) From that perspective, the same information looks like the diagram above.

For the residents of most countries, their relative income has decreased. At the same time, their biocapacity deficit has increased (or countries' reserves have shrunk). If we truly are in an auction world, then this would mean that as countries depend more on other countries' resources, their ability to bid for resources is vanishing. It points to a structural weakening of those countries'economies. Without the global auction, declining relative income would not have affected countries' economies. Take the era of plentiful resources, for instance.

In a world where resource costs are becoming a significant factor, this double trap will become a key determinant of economic success – or failure.

Note: *The* ***Y-axis*** *shows the fraction of the world's GDP an average resident of a given country generates. Therefore, the world average resident's share, per definition, is at (1/world population) or currently at about 0.14 of a billionths of total world GDP.*

Slide 24 -
More countries in the "global auction diagram"

This graph includes more countries that have significant biocapacity reserves. They, too, have shown very rapid loss of biocapacity over the last 25 years. In other words, they have weakened their position as well, but it is less fatal to them, since they are not dependent on foreign resources. In the cases of ecological creditors, they are mainly losing out on opportunities.

Slide 25 -
Where Global Footprint Network works:

Yellow dots indicate countries where government agencies have performed reviews of Global Footprint Network's Ecological Footprint assessments. The green dots show where discussions towards a collaboration are well on their way.

Various international agencies have taken up the Ecological Footprint. The World Business Council for Sustainable Development has used the Footprint as the foundation for its *"Vision 2050"*, UNEP's Green Economy initiative builds on Global Footprint Network's HDI-Footprint approach, and UNDP's *Human Development Report* (as well as *The Economist's World in Figures*) list the Footprint in their data tables.

We are particularly proud that Japan has been one of the first three countries producing a review of our Footprint calculations.

Slide 26 -
In summary:

For most of the 20th century, resources were relatively cheap and easily available. As a result, most countries

have become increasingly dependent on large amounts of natural resources they do not have – both fossil fuels and biological resources. While resources are still relatively cheap, this increasing global demand is meeting a supply crunch. It now takes more effort to harvest fossil fuels and minerals, and, in some places, fresh water. Also, agricultural production is becoming increasingly fuel-dependent. As a result, basic commodities, such as food and fibers, are becoming costlier.

These resource dynamics are turning into an ever more significant driver of economic performance. Economic planners ignoring these trends may put their country's economy at peril.

Global Footprint Network has comprehensive risk assessment tools to document these changing trends and assess their economic impact for 200 other countries around the world, and by extension each country's trading partners. Some overarching trends are presented on our website at www.footprintnetwork.org. The Network's bio-physical assessment of countries' resource performance, coupled with economic analysis, can show structural challenges for countries that are already shaping present economic realities in many locations around the world – and opportunities for overcoming them.