

Grasping the climate crisis

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A Provocation
from the Tällberg Foundation

“Owing to past neglect, in the face of the plainest warnings, we have now entered upon a time of great danger....

The era of procrastination, of half-measures, of soothing and baffling expedients, of delays, is coming to a close.

In its place we are entering a period of consequences... We cannot avoid this period, we are in it now...”

WINSTON S. CHURCHILL,
NOVEMBER 1936

“The difference between what we do and what we are capable of doing would suffice to solve most of the world’s problem.”

MOHANDAS KARAMCHAND
GANDHI (1869-1948)

“Man has lost the capacity to foresee and to forestall. He will end by destroying the earth.”

ALBERT SCHWEITZER,
LATE 1950S

A Provocation

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The Tällberg Provocation is an urgent message to all those who are actively involved in the negotiations of the post-2012 climate agreement.

This Provocation urges them to fully recognise the scale of the task ahead, to overcome the inertia of “climate politics as usual” and to evolve a genuine approach to governing the global commons for the good of all. An important demand stated here is that efforts to reach agreement must be anchored not only in the IPCC reports but also in a series of recently presented new scientific findings. Some of the new knowledge is alarming. It clearly shows that climate change is both more rapid, and its consequences more serious, than anticipated just a few years ago.

The main purpose of this Provocation is to challenge the widespread perception that nations are dealing effectively with climate change when, in fact, almost nothing is happening yet at the global scale. As we all know, the depressing truth is that since the signing of the Kyoto Protocol, carbon dioxide (CO₂) emissions have in fact accelerated, from 1.3 percent per year in the 1990s, to a staggering 3.3 percent per year from 2000 to 2006. Camouflaging the seriousness of the problem is dangerous as it gives the broader public the impression that the situation is under control, when, in fact, it is not.

In these pages we place the major facts on the table – with the hope that climate negotiators, as well as world leaders, will respond to the problems with the level of urgency needed to avert a global climate crisis.

This Provocation is published by the Tällberg Foundation, an independent Sweden-based think tank and convenor of annual global meetings (www.tallbergfoundation.org).

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For over 25 years, the Tällberg Foundation has convened conversations on global issues, generating ideas and proposals for policy, strategy and institutional development that support the interests of the "Whole". The Tällberg Forum is a major annual event where political, business and civil society leaders, scientists, thinkers, activists and entrepreneurs from nearly one hundred nations gather for conversations and workshops related to the opportunities and challenges of globalisation. Our conversations are focusing increasingly on issues of governance, with a special focus on the complex interaction between humans and nature.

This Provocation builds on the thinking that has emerged from these yearly gatherings, and represents the work of the Tällberg Foundation over the years. We believe that the following considerations must underpin the negotiation and implementation of the post-2012 climate agreement.

First, climate change must be addressed within the wider challenge of preserving the capacity of global ecosystems to continue to function as sinks for greenhouse gases, and avoid ecosystem feedbacks that accelerate global warming.

Second, greenhouse gas emission reduction targets and other policy measures must reflect the most current, authoritative and independent science. Action for mitigating climate change must be based on a risk-management approach that steers away from the risk of planetary tipping points.

Third, ethics and equity must lie at the core of the global response to climate change. Without a focus on global equity, the response will be only partial and inadequate.

Fourth, the ultimate effectiveness of the post-2012 climate agreement depends on global governance reform that promotes the greater common good over national interests, and addresses the policy and market failures that produce environmental degradation, such as climate change. Success also depends on redressing the enforcement deficit that undermined global environmental governance approaches in the past.

The Tällberg Provocation contains three sections. The first section is entitled “*At the point of no return: an introduction to our thinking*”. Here we describe how the current political and economic systems promote national interests over the interests of the whole. This institutional shortcoming undermines the integrity of both the climate and ecological systems. We also highlight the moral obligation of industrialised nations to support developing countries onto a sustainable development path. And finally, we emphasise that unless nations are legally bound to new norms of collective responsibility, it will be impossible to align human activity within the Earth’s ecological boundaries.

The second section is entitled “*Reflections on the problems and challenges in the current climate negotiations*”. In this section, we highlight four critical considerations that have not received sufficient attention in the post-2012 negotiations and which must be addressed as a matter of urgency. They include: the disregard for the wider ecosystem challenges; the failure to include the most recent scientific findings combined with a lack of understanding of the fundamental risk of planetary tipping points; insufficient consideration of the imperatives of ethics and equity; and limited attention to the role that global governance reform plays in ensuring the ultimate effectiveness of the post-2012 agreement.

The third section is entitled “*Imperatives for climate leadership reflecting the true dimension and nature of the crisis*”. Here we bring tangible solutions for inclusion in the post-2012 climate agreement to the attention of climate leaders in response to the four considerations.

Our firm opinion is that the knowledge and insights needed to motivate decisive action already exist. However, the important policy solutions, many of which are referred to in this Provocation, will remain abstractions as long as nations do not come together to agree on a plan that reflects the magnitude of the problem and which is supported by the most rigorous of compliance measures.

Section One

At the point of no return: an introduction to our thinking

With one year left for the final round of negotiations to try to stabilise the climate system, the world faces a breakdown of the global financial system. The consequences are staggering, with ripple effects the world over that deliver the severest blows to the poor. Fear is rising. One would have expected somewhat of the same level of anxiety with regard to the looming breakdown of major parts of the Earth system – rapid deforestation, overfishing, freshwater scarcity and the disappearing Arctic sea ice. Reports of such events and processes are abundant, but the level of concern is still conspicuously low.

The global financial crisis is intimately linked to the global environmental crisis. Both are ultimately the result of an economic policy framework that stimulates immediate value creation at a level far beyond the assets (or capital) available, whether financial or natural.

It remains to be seen which actions will be taken to secure the stability of the financial markets, but we know that so far they have been considered in isolation from the climate crisis. This demonstrates that governance systems have not kept pace with the reality of globalisation and the impact it has on the ecological systems that support it. The rapidly growing disparities in the world are both a moral outrage and a threat to stability. Meanwhile, the principles on which the economic system is based – separated as it is from the natural world – have put humankind on a collision course with the Earth's physical and biological systems. The emperor of the global economy has no clothes.

Nature does not provide bail-outs

The mainstream model of development is based on certain assumptions about the way the world works. These assumptions emerged during the early industrial revolution when the world was still scarcely populated. Natural resources were in abundance and Nature was perceived as having an infinitely large capacity to absorb waste and residue materials. In such a situation, it made sense to focus all efforts on growing the economy, measured as GDP, and not to worry about environmental problems.

The world has changed dramatically. Global population has risen from one billion people in the early 19th century to almost seven billion today. The world economy has grown more than ten times since World War II. Consumption of resources is rising rapidly, biodiversity is plummeting and just about every measure shows humans affecting Earth on a vast scale. Many scientific studies tell us that our economy has reached the point where it is outstripping Earth's ability to sustain it. Resources are running out and waste sinks are becoming full.

Climate change is to many the most obvious example of overshoot, but there are many others. The world's largest scientific analysis on the health of our planet to date, reported in 2005 by the UN Millennium Ecosystem Assessment (MEA), showed that two thirds of the most important ecosystems – tropical forests, marine ecosystems, soils, fresh-water resources etc – are being used beyond their capacity to generate goods and services to humanity. The recent study “The Economics of Ecosystems and Biodiversity”

estimates that we are losing between 2 and 5 billion dollars of natural capital each year from deforestation alone. This loss does not make headlines in *The Financial Times* despite the fact that it is generating an even greater cost to the global economy than the financial crisis. Destruction of ecosystems is a long-term economic and human crisis with future costs that are incalculable. Human activity is nearing or has already passed nature's boundary conditions. We have entered the danger zone of "tipping points" where our impact threatens to irreversibly change the services provided by ecosystems.

A key difference between the economic and social disasters experienced in the past, and the ecological disasters we are facing now, is that social disasters have been possible to reverse. We were able to rise both after the World War II, the IT bubble and the Asian financial crises of the 1990s. And we will certainly rise after the current financial crisis. However, it will be almost impossible to reverse a planetary environmental crisis – at least in a time-scale relevant to humankind.

If humanity triggers self-reinforcing feedbacks in ecological systems, (where one change creates a loop of escalating effects) environmental degradation may spiral out of our control. We cannot make the ice sheets refreeze. We cannot recreate the rainforests. We cannot put a halt to large-scale methane leaking from the tundra, once it has started.

Pushing our wealth-creating systems beyond their own ability to sustain and correct themselves is disastrous, as we can see from today's financial crisis. Pushing the natural system beyond its finely tuned and balanced equilibrium is even more dangerous. It is reckless. Nature does not provide bail-outs.

An overdue moral reckoning

After centuries of unequal wealth distribution, many developing countries – some at high speed – are now catching up with the industrialised world. They are using the same production and consumption systems that led to wealth creation in the OECD countries. The additional impact on natural systems of this long awaited and welcome emergence from poverty is nothing less than a tragedy.

Without a deliberate and intensive effort from all nations to place development onto a path that will not destroy the environment, eliminating poverty will tip many natural systems beyond stability – beginning with climate. This is a huge moral issue for the entire world and for industrialised countries in particular. Through centuries they have benefited from cheap oil, minerals and timber from the poor countries and carry the main responsibility for taking natural systems to the brink of destabilisation.

Climate change will make poverty reduction increasingly difficult to achieve. The state of the world's ecosystems and the rising population means that pursuing a path of conventional growth is no longer an option. The truth is that today, poverty reduction and improved human wellbeing are intrinsically linked to increased energy use and economic growth. This can only come from the use of cheap fossil fuel. It is now clear that this pathway is a recipe for disaster. In our understanding, fair access to energy and natural resources will become the dominating issue for generations to come and is already generating a mistrust that threatens to derail these vital climate negotiations.

Mistrust is based on several recent failures, such as the reluctance of industrialized countries to deliver adequate support for adaptation and technology transfer, but it also has historical roots. For many years, industrialised countries have failed to deliver on promises to expand development aid. As with countless environmental agreements, few of the Millennium Development Goals solemnly endorsed by 190 nations on September 25, 2000, will be met. Had developing countries started – with strong support from industrialised countries – to invest in low – carbon technology more than fifteen years ago, when the idea of a technology fund was first raised, the prospects for climate negotiations would look very different today.

A future sense of collective responsibility

We have a collective responsibility to reverse this damaging trend by introducing economic policies and new technologies that allow us to develop a human community within the planetary boundaries and in harmony with nature.

But how? We have never found ourselves in a situation like this. We have never found ourselves in a position where we have to heal and restabilize the ecological system of which we are a part. A vision is required that can unite all people and all nations behind a cause which is larger than any one single individual economic and national economic interest.

The post-2012 negotiations should be the first step in the direction of governance for the common good, and put in place a permanent process of taking decisions and revising decisions as new knowledge and insights emerge. While we agree there is an urgent need for ambitious targets of emissions reductions over the long term, it would be premature to lock the world for an extended period of time into static objectives based on an incomplete understanding of the complex problems we face. Negotiators are not dealing with a mechanical system but with dynamic interactive natural systems in continuous flux. Experience also tells that most internationally adopted objectives and targets are rarely complied with. Thus, it is

certain that yearly updating will be necessary along with the progressive sharpening of objectives. An evolving system of measures must be supported by a strong long-term vision to eliminate all anthropogenic greenhouse gases and to end the destruction of supporting ecosystems within a defined time-frame.

In summary, this Provocation from the Tällberg Foundation asks readers to accept the wider context of climate change. Whether we like it or not, it is time to acknowledge the breadth of the complexity facing humanity, and realise that we can only stabilise the Earth's climate system if we realise that what is required is not a climate agreement, but an agreement for planetary sustainability. Managing emissions alone will not be sufficient. Active stewardship of the Earth's ecosystems, together with massive support for resilience-building, adaptation, and economic and social transformation in the face of substantial unavoidable climate change will be required.

We wish to inspire a sense that the crises of our time provide a window of opportunity to formulate the vision of a world based on sustainable relations between ourselves and with nature. If we fail to grasp this opportunity now, we may not be given a second chance.

Section Two

*Reflections on the problems and challenges
in the current climate negotiations*

Four considerations:

1. The current climate negotiations are failing to address the context of wider ecosystem challenges in which climate policy must be developed.
2. The current climate negotiations are not based on the latest scientific evidence that indicates potentially disastrous tipping points in Earth systems.
3. The negotiations are not sufficiently addressing the imperatives of ethics and equity in the context of a global response to climate change. This is a serious omission that will undermine the UN FCCC's objective of preventing dangerous human interference with the global climate system.
4. The ultimate effectiveness of the post-2012 climate agreement will be undermined without global governance reform that secures implementation of policy and market instruments to reverse the market failures responsible for environmental degradation and climate change. A mechanism for securing the enforcement of agreements is essential.

1. The current climate negotiations fail to address the context of wider ecosystem challenges in which climate policy must be developed.

It is a dangerous over-simplification to believe that the climate change challenge can be resolved in isolation from an understanding of the wider Earth system. The post-2012 negotiations are fundamentally flawed in their singular focus on human-induced climate change. What actually faces nations as they gather to understand how to prevent serious climate change is the risk of wider and potentially abrupt global environmental change.

The urgency to address this broader context is fuelled by a growing scientific understanding of the complex interactions between the global climate system and marine and terrestrial ecosystems. Human-made emissions interact with the planetary systems such as oceans and forests, with knock-on effects that are only beginning to be understood. Unexpected feedbacks can be triggered that are likely to prompt accelerated or runaway climate change.

The oceans and terrestrial ecosystems have camouflaged global warming by absorbing roughly half of human-made emissions. This enormous and free, “ecosystem service” to humanity has resulted in an estimated sink of some 350 gigatons of carbon absorbed by vegetation, soils and oceans. This is approximately the same amount as the total cumulative increase of carbon in the atmosphere from human emissions. However, there is now growing evidence that the capacity of Earth’s carbon sinks is weakening.

This is a serious dilemma for humanity. At a moment in history where – more than ever before – we need a “strong” Planet with a high degree of ecological resilience, we have pushed it to the weakest point ever. Human emissions and the degradation of aquatic and terrestrial ecosystems are exhausting the planet’s capacity to buffer dangerous climate change. What is worse, through activities such as deforestation, soil erosion, overfishing and bad management of fresh-water resources, we have seriously degraded the vast majority of ecosystems, thus reducing the capacity of the Earth system to respond to future shocks.

One active precautionary approach is to define our planetary room for manoeuvre. The Stockholm Environment Institute and the Stockholm Resilience Centre – strategic partners to the Tällberg Foundation – have led a process to identify key, non-negotiable boundaries that maintain the integrity of the Earth system. These thresholds go well beyond climate and will also include systems such as the stratosphere, oceans, freshwater, the large nitrogen and phosphorus cycles, and land use.

The work defining planetary-level boundaries that provide a safe space for human wellbeing is of critical importance for the climate negotiations as it highlights the interconnectedness of the sub-systems of the Earth system as a whole. The gradual increase of ocean acidification for instance, could result in the crossing of a tipping point, rapidly reducing the ability of the oceans to absorb CO₂.

Terrestrial ecosystems absorb 25 percent of greenhouse gas emissions. This indicates that in order to avoid aggravating climate change, a limit must be set to the land use change across the entire planet. Expansion of agricultural land is the major driver behind massive loss of ecosystem services over the past 50 years; it is also the source of 20 percent of greenhouse gas emissions. If this trend continues, the risk is obvious that terrestrial ecosystems will not continue to provide the necessary services to humankind (such as biodiversity, water regulation, pollination of plants, build-up of soils etc.).

A reduction of the planet's capacity to absorb greenhouse gases will increase the share of human-made, or anthropogenic, emissions that remain in the atmosphere and accelerate warming. The overall result is that humankind is reducing the stability and predictability of the climate system. This stability has been the pillar on which we have built our trust in the future for many thousands of years, including our investments in technology and infrastructure.

There may be scientific uncertainties regarding the details of human-induced positive feedbacks (feedbacks that reinforce global warming) originating from destabilised ecosystems. The knowledge that these risks exist, however, is increasing. Only the world's soils hold a massive carbon stock of some 2500 gigatons of carbon, i.e., more than seven times the cumulative human emissions of CO₂ from fossil fuel burning. The ocean stocks are even larger.

For the first time in ten years, scientists recently report new outbursts of methane from the Arctic Sea. This has sparked increasing fear that large methane outbursts may occur as a feedback from the (now) rapid thawing of the permafrost in the Siberian tundra. We know that the pH is dropping in the world's oceans, which in turn reduces the ability of species in the oceans to continue absorbing CO₂. These early signs are very worrying because a worst case scenario would be a major accelerator effect on global warming from a planet that itself starts to emit greenhouse gases from these known stocks of carbon. In this case, a planet that has been absorbing our emissions (i.e, has been a friend) becomes source of greenhouse gases – and thus a terrible foe.

The Copenhagen process must address the reality of the larger ecosystems challenge we face. Healthy ecosystems are a precondition for stabilising the climate system. But the current negotiations are not addressing critical issues related to the resilience of ecosystems and to ecosystem services and are thus seriously flawed.

2. The current climate negotiations are not based on the latest scientific evidence that indicates potentially disastrous tipping points in Earth systems.

The 2007 IPCC 4th Assessment Report provides a wealth of scientific evidence and contains the most important overall assessment of the dangers facing humanity. The consensus report, however, for various reasons, did not include any scientific evidence generated after 2006. Since then, there have been remarkable developments in climate science and global environment change science. Important new observations of the accelerating and worsening impacts of climate change have been reported, which were simply unknown to climate scientists only a few years ago. While this new knowledge must underpin negotiations, interim IPCC reports, which comment on some of these findings, are not sufficiently visible or available to politicians and negotiators. A mechanism is required that brings major new scientific findings to the attention of decision makers in a timely manner.

The new scientific findings seriously question at least three of the basic assumptions underpinning the UNFCCC-led negotiations: first, whether it is at all possible to stay within the two degree Celsius target if the goal for negotiations is to reduce global emissions by half by 2050; second, whether the two degree Celsius target is sufficient to avoid “dangerous climate change”; and third, whether we have already reached a danger zone today in terms of concentration of greenhouse gases. Several new reports indicate that atmospheric CO₂ levels must be reduced below the levels that already exist today to avoid climate disasters.

The current level of CO₂ in the atmosphere is 385 parts per million (ppm). Recent assessments show that we have probably already reached about 450 ppm of CO₂ equivalents (CO₂eq), taking into account the concentration of other greenhouse gases (CH₄, O₃, CH₂, N₂O). Based on the EU “translation” of the IPCC two degree Celsius target to 450 ppm (i.e., that 450 ppm CO₂eq corresponds to two degree Celsius warming), this means that we have reached the ceiling of greenhouse gas concentration in the atmosphere.

We are already in the danger zone, even without factoring in new scientific findings.

New reports from the UK's Hadley Centre and by Dr. Hansen, Director of NASA's Goddard Institute of Space Studies, seriously question the two degree Celsius target stated by many parties in the negotiations. Dr. James Hansen has long argued that the two degree Celsius target is not ambitious enough to avoid the risk of dangerous climate change. He has recently suggested – together with a team of scientists from the US, the UK and France - an upper limit for the increase of the average temperature of + 1.7 degree Celsius, above which level a destabilization of the massive land ice sheets is likely to occur. The consequence of this research is a growing insight that the long-term concentration CO₂ in the atmosphere should not exceed 350 ppm.

Perhaps the most frightening truth is that we are already rapidly approaching global warming scenarios that are far worse. Kevin Andersson and Alice Bows of the Tyndall Centre argue that even an optimistic interpretation of the current trajectory of greenhouse gas emissions and the feed-back mechanisms is unlikely to reveal a stabilisation of greenhouse gases much below 650 ppm CO₂eq. According to the IPCC, a concentration at that level is likely to generate a temperature increase in the range of 3.2 to 4.0 degrees Celsius.

This indicates that it is not only mitigation targets that are out of line with recent scientific findings. The adaptation measures currently being discussed in the post-2012 climate negotiations, are also completely outdated by failing to take into account the prospects of the above mentioned four degree warming.

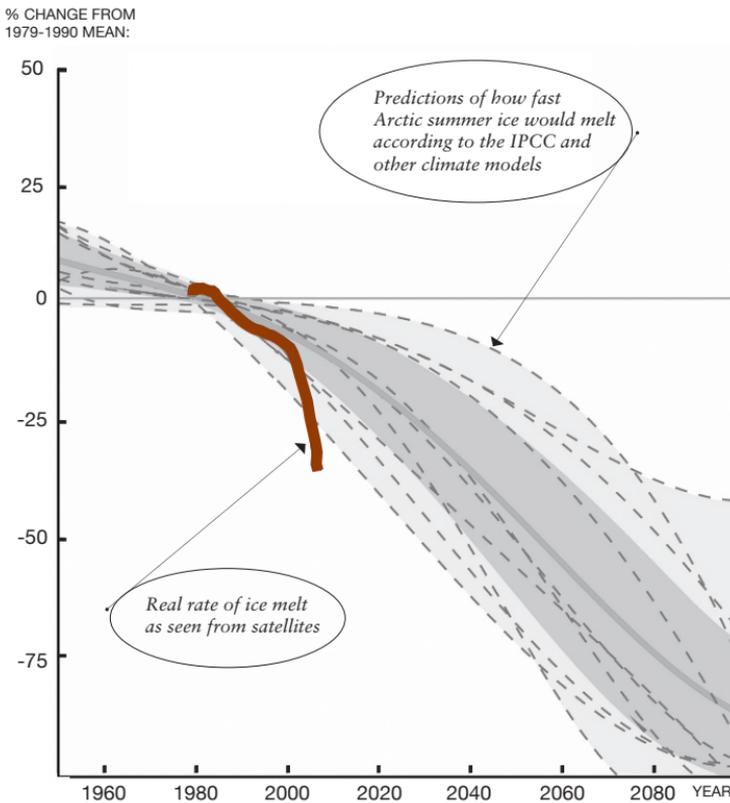
The post-2012 negotiations must promote mitigation policies that aim for no more than a global temperature increase of 1.7 degrees Celsius and simultaneously plan for adaptation policy that is designed to cope with a warming of 4 degrees Celsius. Without these as fundamental targets, negotiators will be ignoring important scientific evidence and will be failing to respond to mounting risks of dangerous climate and environmental change.

Feedbacks

One important aspect of climate change that has recently been understood and which is insufficiently reflected in IPCC-4 relates to feedback mechanisms in the Earth's global ecosystem.

Fast and *slow* feedbacks, working aggressively at the same time, could offer an explanation as to why the IPCC predictions so far have been inaccurate as to the speed of change. No one knows how long the climate system can withstand these feedbacks before tipping out of control.

Figure 1. Summer ice melt in the Arctic: comparing models with reality
Adapted from Sorteberg, A. University of Bergen, Norway, data from Snow & Ice Data Center, Boulder



Fast feedbacks can already be seen in the dramatic summer ice melt in the Arctic, Figure 1. The latest measurements show that the Arctic Ocean is losing summer ice more than 30 years ahead of IPCC predictions. Almost half of the normal ice cover during summer has been lost. This has reduced the reflective capacity of the polar ice sheet, i.e. the albedo, by an estimated four million km². A combination of a lower albedo and warmer ocean temperatures is causing a domino effect of accelerated warming. This clearly illustrates a serious underestimation by scientists. As seen in Figure 1, no models were able to predict this sudden threshold effect.

Slow feedbacks, thought to happen over centuries, include melting permafrost and the warming of the oceans. This summer, a scientific survey of the Siberian tundra coastlines reported methane levels roughly 100 times above normal. Methane is a greenhouse gas that is twenty times more powerful than carbon dioxide. More than ten times the annual global greenhouse gas emissions is thought to be trapped in frozen tundra across the world. As tundra thaws, it becomes a potential “Methane Bomb”. This is not a new phenomenon. Release of methane from tundra was the main cause behind huge swings in temperature earlier in history. That this could happen again was always a possibility, but it was not supposed to happen so soon.

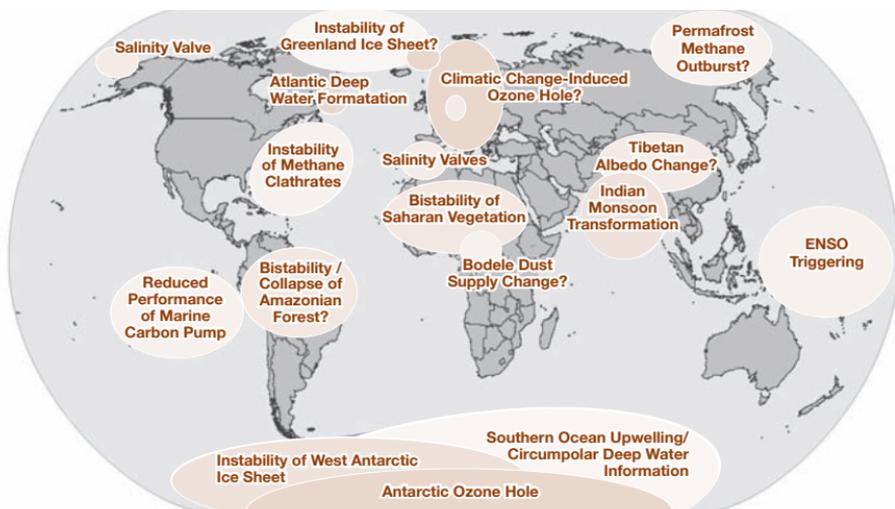
Tiping Points

It is of critical important to realise that scientific research show that tipping points are not an exception, but rather appear to be a universal part of ecosystem behaviour. Ecosystems, from local lakes to regional savannah regions, are characterised by non-linear dynamics, with long periods of seemingly no change, followed by periods of rapid change. Such sudden state changes have been experienced in recent history, e.g., the shift from a wet to a dry Sahel or the “Dust Bowl” collapse in the US mid-west in the 1920s. A much feared similar sudden event today would be for the Amazon rainforest to “tip over” to a dry savannah state under the multiple pressures from global warming and deforestation.

This non-linear behaviour is both a blessing and a threat to humanity. It provides civilisations with the resilience required to safeguard long periods of stable development by buffering/absorbing disturbances from human over-exploitation of ecosystems. But non-linearities and the tipping points they cause are a threat as they lull us into a false sense of security. A dramatic example of this is the cooling effect of aerosols. It is well understood that aerosols (nitrates and sulphates) from industrial and transport pollution in urban areas and from biomass burning help cool the planet. They counterbalance the warming from greenhouse gases by reflecting incoming sunlight. Recently, new science indicates that this cooling effect has been significantly underestimated, and that it already today may correspond to a cooling of approximately one degree Celsius, masking a significant proportion of the human-induced warming from greenhouse gas emissions to date.

This insight presents two substantial challenges. First, due to the short-lived nature of nitrate and sulphate aerosols compared to CO₂ (a couple of weeks compared to more than 100 years), removing them would lead to an immediate loss of cooling sources. Second, the current trend to clean our cities and eliminate dirty biomass cookers are moving faster than efforts to reduce emissions of the longer lived greenhouse gases such as methane, nitrous oxides, carbon dioxide, ozone and halocarbons that arise from destruction of forests, agriculture, industry and transport. We are thus reducing the cooling faster than we are reducing the warming.

Today, it is impossible to ignore the risk of many unacceptable climate change-induced regional tipping points in the Earth system. Figure 2 shows many of these in a map developed by Prof. John Schellnhuber of the Potsdam Institute for Climate Impact Research (PIK). The collapse of major sub-systems of the Planet would result in disastrous social and ecological impacts for hundreds of millions of people. For example, the instability of the Greenland ice sheet may cause several meters of sea-level rise affecting billions of people on a planet where soon over 50 % of the world's population live 50 km from the coast. Transformation of the Indian monsoon would destroy decades of agricultural progress from the Green Revolution.



Tipping elements in the climate system. Adapted from Schellnhuber and Held 2002

Given the greenhouse gas concentration levels we are approaching today, the risk of self-reinforcing climate change can no longer be excluded. The absence of a clear risk management approach in the work of the IPCC that specifically addresses seemingly low-probability events with catastrophic consequences is a serious shortcoming. The public has a right to know about such risks and how they can be averted. But the IPCC process and reports does not include these important discussions.

The lack of attention to these “fat tail” risks (i.e., those low but not insignificant risks of a potentially disastrous result) is surprising, given that a primary objective of the UN Framework Convention on Climate Change is to assure that humanity does not push the planet towards dangerous climate change. This overall aim has been lost along the way, and instead the “reduction targets” on the table seem to be negotiated compromises between mainstream science and what seems politically possible to achieve. This is a dangerous route.

It is time to accept the evidence that climate events will most likely unfold in a way that departs dramatically from existing models. The sudden and surprising crossing of a tipping point of arctic ice melting is a major global warning and represents a fundamental dilemma with climate negotiations as currently organised. The evidence of tipping points has not to our knowledge resulted in a stated intention to take active precautions against the risk that human-emissions act as a trigger, destabilising other sub-systems of the Earth system, thereby causing an uncontrolled warming spiral.

3. Negotiations are not sufficiently addressing the imperatives of ethics and equity in the context of a global response to climate change.

In order to re-establish trust between developing and industrialized nations, revitalize climate negotiations, and avoid future conflicts over scarce natural resources, the fundamental principle of equity must underlie the post-2012 climate agreement. Unless developing countries are on board, any attempt at agreement will inevitably fail.

An emergency climate stabilization plan does not allow developing countries to go through the same carbon-intensive stages of development as the North. Radical transformations of technology and energy systems are needed. This requires industrialized countries to provide large-scale technological and financial support. The necessary technology transfers are not primarily about generosity – but represent a much needed settlement of a historic debt and a fair sharing of the burden based on the capacity among rich and poor nations. This moral imperative is strengthened by the recognition that a large share of developing country emissions is caused by products that are consumed in the industrialized world. Strengthening the enforcement and implementation of existing commitments under the UNFCCC is a necessary first step.

However, the uncertainty over financial resources for both mitigation and adaptation is deepening historical North/South mistrust. Developed countries should be required under the post-2012 agreement, to adopt legally binding annual funding commitments for both mitigation and adaptation measures in developing countries. This could follow the effort-sharing model proposed in the Greenhouse Development Rights framework (GDR), developed by the Stockholm Environment Institute with partners, basing efforts on historical responsibility for climate change as well as level of economic development and capability to pay.

Rather than framing the “North” as a culprit and grouping all countries of the South together, the GDR framework identifies the affluent and consuming classes in all nations as those who must assume the bulk of the effort of climate transition. It codifies the right to development as a “development threshold” at twenty USD per person per day, above which people are given a gradually increasing responsibility to protect the climate.

The GDR framework would necessitate a very dramatic path of emission reductions in industrialized countries, and a large transfer of funds from industrialized countries to developing countries. The size of emission reductions and international transfers implied by this framework are however not primarily a consequence of its effort-sharing arrangements, but of the necessary emergency return to a situation where the concentration of CO₂ in the atmosphere is just 350 ppm.

Apart from an equitable effort sharing mechanism, a successful and equitable post-2012 agreement will also require a much larger role for adaptation than has been the case in climate change negotiations so far. Developing countries have contributed least to climate change. However, they will suffer the most from its consequences and have the least capability to deal with the impacts. Compensating developing countries for the costs of adapting to climate change is a stated obligation under the UNFCCC.

4. Recognise that the ultimate effectiveness of the post-2012 climate agreement depends on global governance reform that promotes the greater common good by addressing the policy and market failures responsible for environmental and social injustices, and reverses the enforcement deficit that has undermined past agreements.

Countries with high degrees of equity and transparency are those who generally offer political and social stability and decent management of their environment. What works for the national level must in the future also be adopted on the global level. A new generation of governance is required that not only satisfies the interest of the parts – nations – but also meets the legitimacy of every citizen’s interest that the whole of the Earth system and the economy work with a high degree of stability, efficiency, predictability and security. Nowhere is this more evident than in the climate change negotiations. And nowhere is the need for a “pooling of sovereignty” and for robust regimes based on genuine global cooperation more urgent than in the global response to climate change.

The track record of implementation for environmental agreements and climate deals such as the Kyoto Protocol is discouraging. Despite good intentions, new science and knowledge, despite investments in environmental policies and technologies, and despite the concerted efforts of civil society, the ecosystem continues to decline. Despite the Kyoto Protocol, CO₂ emissions have increased by 35 percent since 1990. This rate is accelerating.

Former US Vice-President Al Gore recently stated that the greatest obstacle to transitioning to a carbon-free energy path is the “dysfunction in our politics”, which always avoids offending special interests. This is true for countries all over the world. The problem to be solved by post-2012 negotiators is a systems problem. Nature is a complex, multidimensional, adaptive and self regulating system in constant flux. This “Earth system” knows

no borders – but nations do. Priorities at the negotiation table are dictated by fragmented national interests creating a mismatch with the reality of ecological systems. This means that the management of the climate and environmental crisis is a governance problem.

The post-2012 process must, by linking up with other multilateral initiatives, contribute to building more robust and effective global governance systems. Nowhere is this more pressing than in the context of international environmental governance, which has proven incapable of addressing the complex interactions between environmental processes, economic development and poverty. Despite the important contribution of the Millennium Ecosystem Assessment and UNEP's GEO 4 Report, the links between science and existing wider decision-making are weak and disjointed.

Climate talks in Bali, Bonn, Bangkok and Accra of the past twelve months have demonstrated that industrialised economies continue to delay efforts to strengthen the international climate regime by resisting to assume their share of the task of transforming global energy systems. Therefore, we can draw no other conclusion than that there is a considerable risk even the best possible agreement signed in Copenhagen is likely to fail or be ineffective because of the lack of political will to prioritise environment over short-term economic and geopolitical strategic interests. The total absence of power to enforce compliance with environmental agreements is a major deficiency.

Business and markets will play a pivotal role in combating climate change. While business provides innovation, financing, product-to-market and logistical skills, markets are managed and regulated under laws decided by the political systems. It is the responsibility of legislators to adopt the necessary political objectives, laws and regulations that ensure effective implementation processes.

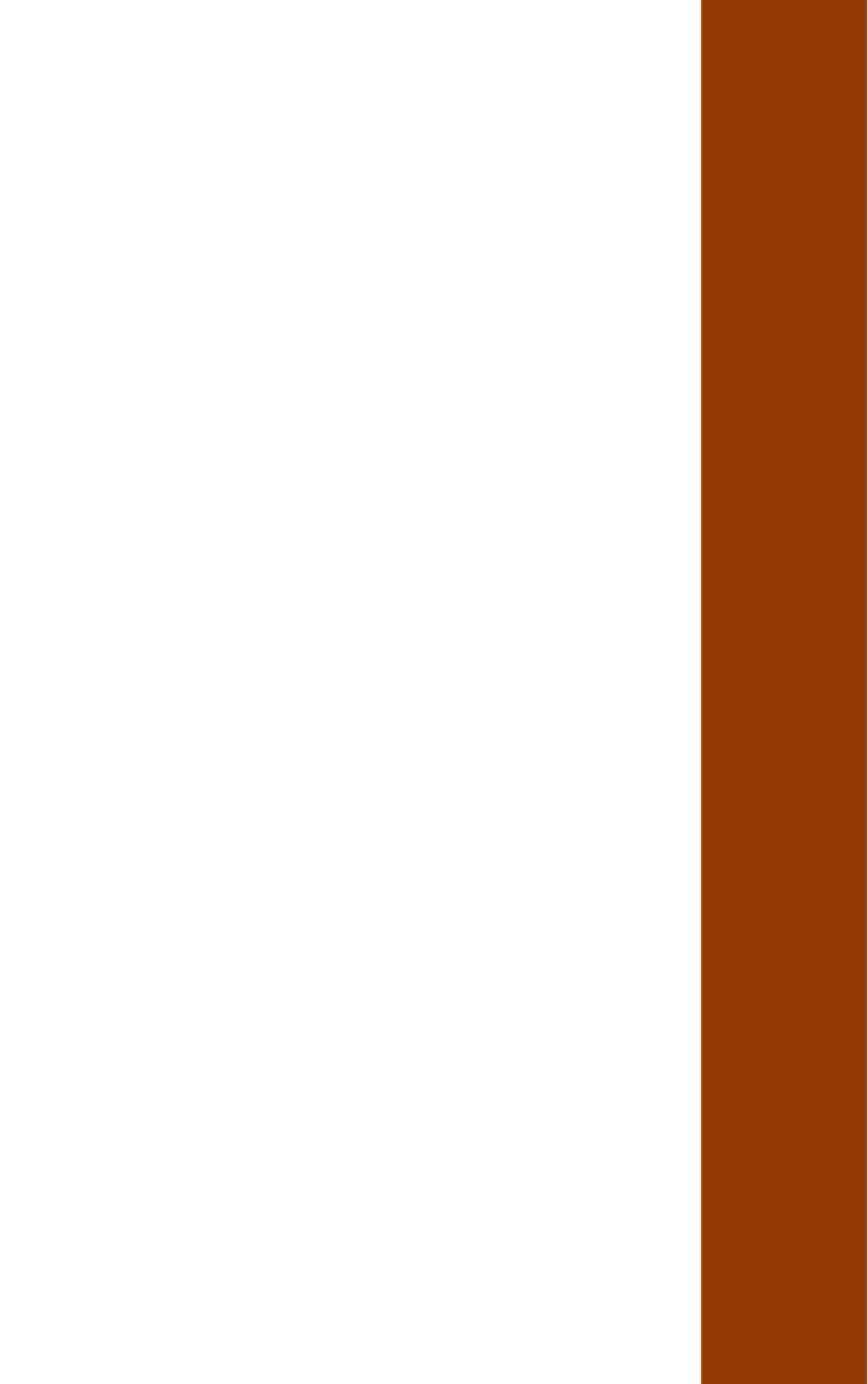
As in all law enforcement, measures and sanctions will be required against those nations, sectors and businesses that do not comply with agreements. Past and current failures are as much failures of the political system to lead and regulate as they are failures of markets to foresee and avoid undesired consequences. Business and markets are key to successful implementation.

The financial crisis proves that tightly interdependent systems cannot work without coordinated oversight, governance and regulation. The financial/economic crisis also demonstrates that economic priorities and concerns trump environmental concerns in the short term political reality. The interrelationship between nature and economy has both philosophically and policy-wise become decoupled over the last few hundred years – with disastrous results.

We have to live within the planetary boundaries set by the ecological systems. Thus we believe that there can be no reliable agreements or implementation thereof until nations of the world have come to a consensus that they are interdependent of one another and that they are all dependent on nature's capacity for renewal of its resources and on the predictability of its behaviour.

The concepts of the nation state and of sovereignty need to be modified and adapted to the realities of the risks and opportunities of a new world of interdependence. While we reject the concept of a “world government”, preferring instead that the principles of subsidiarity, decentralization, democracy and free markets prevail, we urge that a new political cooperative and new relational mechanisms between nations are developed.

The post-2012 negotiations must help define the demands on a new governance systems and the agreement reached should itself be a part of this renewed international community.



Section Three

Imperatives for climate leadership, reflecting the true dimension and nature of the crisis

Four Imperatives for Climate Leaders

1. Address climate change within the wider challenge of preserving the regenerative capacity of global ecosystems.
2. Ensure that the post-2012 regime is developed on the basis of the most current, authoritative and independent science, and guards against the real risk of planetary tipping points.
3. Embed principles of ethics and equity at the core of the global response to climate change.
4. Recognise that the ultimate effectiveness of the post-2012 climate agreement depends on global governance reform that promotes the greater common good by addressing the policy and market failures responsible for environmental and social injustices, and reverses the enforcement deficit that has undermined past agreements.

First Imperative

Address climate change within the wider challenge of preserving the regenerative capacity of global ecosystems.

Preservation of the functioning of the planet's ecological systems must underpin all aspects of climate negotiations as they are the most important buffer against the worsening consequences of climate change. The existence of planetary boundary conditions must be respected. In this way, we can guard against the destabilising of ecological systems, which is the greatest threat to humanity.

The Task for Climate Leaders is to:

- Establish an intergovernmental panel on global ecosystem services to work in tandem with the IPCC. (i.e., that nations support the proposed establishment of a UN inter-governmental panel.)
- Ensure that the post-2012 regime focuses on the protection and enhancement of ecosystem carbon sequestration services and ensures the reversal of the current ecosystems overshoot. Concrete, global measures must be developed for protecting critical ecosystems, such as payments for ecological services that reward conservation and penalise destruction.
- Ensure that the post-2012 regime issues targets for mitigation and emissions reduction grounded in considerations of ecosystem service function and not just on economic values.
- Recognise the critical carbon sequestration services provided by forestry and land-use. This requires regulated and properly incentivised market mechanisms to control deforestation and land degradation as well as significant financial support to developing countries for sound forestry management and forest ecosystem protection.
- Ensure the sustainable management of marine ecosystems to protect and regenerate their rich biodiversity and to protect their carbon sequestration services.

Second Imperative

Ensure that the post-2012 regime is developed on the basis of the most current, authoritative and independent science and guards against the real risk of planetary tipping points.

The latest authoritative climate science has now defined the parameters within which reduction targets must be set. Essentially, emission reduction targets must recognise and respect the risk of tipping points, by reflecting the best science, not the politics of least resistance.

The Task for Climate Leaders is to:

- Adopt a temperature target of 1.7 degrees Celsius and take the necessary steps to maintain atmospheric carbon dioxide concentrations at what is currently understood to be the safe level of 350 ppm, and develop a rapid-response mechanism for the regular revising of these and all other targets in line with evolving scientific understanding of tipping points in the climate system.
- Base adaptation planning and cost estimates on a 4-degree Celsius warming trajectory in line with the precautionary principle.
- Short, medium and long-term reduction targets must be set within the parameters that the latest climate science has identified as critical for avoiding dangerous human interference with the global climate system, and which the GDR framework has identified as fair and equitable. These include:
 - A long-term collective global greenhouse gas emissions reduction target of at least 90 percent by 2050.
 - Long-term domestic emission reduction targets for Annex I countries of 100 percent by 2050 to be achieved entirely by domestic at-source reductions in order to ensure the transition to a carbon-free energy path.

- Long-term energy intensity reduction targets to be adopted by rapidly industrialising countries in order to reduce the amount of energy per unit of GDP.
 - Medium-term domestic emission reduction targets for Annex I countries of between 70 to 80 percent by 2035, supplemented by a 40 to 50 percent emissions reduction to be achieved through additional climate-friendly investments in developing countries.
 - Short-term emission reduction targets for Annex I countries of 75 percent by 2020 in which up to 50 percent of reductions must be achieved domestically, with the remainder through additional climate-friendly investments in developing countries.
 - A 50 ppm CO₂eq buffer for targets for all green house gases in light of the uncertainty regarding feedback mechanisms.
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- Request IPCC assessments of the state of climate science on an annual basis, with development of a rapid-response peer-assessment mechanism to bring relevant new research to negotiators and policy makers in the shortest time possible.
 - Mobilise the necessary levels of investment in negative mitigation pathways, i.e., ways to remove carbon from the atmosphere, such as avoided deforestation, afforestation and reforestation.

Third Imperative

Ethics and equity must lie at the core of the global response to climate change

Ethics and equity must lie at the core of greenhouse gas reduction effort-sharing and adaptation agreement in order to mobilise a truly global response to climate change. Not only does this mean recognising current, historical and per capita emissions, it also requires forging new forms of solidarity and the mobilising of a genuinely collective response to overcome the deep political divides and narrowly construed national economic interests that have dominated climate negotiations up until now.

The Task for Climate Leaders is to:

- Promote a much-needed shift in ethical principles by expanding awareness of moral responsibilities beyond today's global population to include ecological systems and future generations.
- Implement the principle of “common but differentiated responsibilities” by adopting the effort-sharing “Greenhouse Development Rights” (GDR) framework that aims to stabilise the global climate system while protecting the right to sustainable human development.
- In line with the GDR framework, Annex I countries must commit to a domestic long-term reduction target of 100 percent, to which investments that lead to emission reductions developing countries must be added. Rapidly industrialising economies must take an increasing responsibility. All commitments must have the stated aim of ensuring transition to a global carbon-free energy path.

- Ensure that Annex 1 countries adopt legally binding annual funding commitments for adaptation measures in developing countries. This is both a fundamental moral obligation and an absolute necessity to obtain developing country support for any post-2012 agreement.
- Ensure the rapid-response transfer of financial and technology resources to emerging economies and developing countries in order to enable them to leapfrog the most carbon-intensive stages of development onto a carbon-free energy path.

Fourth Imperative

Recognise that the ultimate effectiveness of the post-2012 climate agreement depends on global governance reform.

A reform of global governance is needed to promote the greater common good. It must address the policy and market failures responsible for environmental and social injustices, and reverse the enforcement deficit that has undermined past agreements.

We acknowledge that changing the institutional architecture of the global energy, trade and investment regimes is outside the scope of the negotiations of the post-2012 climate agreement. However, the ultimate effectiveness of the post-2012 climate regime depends on a fundamental re-orientation of all these regimes.

The Task for Climate Leaders is to:

- Commit to overcoming the deep dysfunction in global governance systems. This means developing new approaches for pooling national sovereignty and for forging genuine cooperative approaches that promote the interdependence between human systems and ecosystems.

- Work to define a structure of oversight, governance and regulation that goes beyond the world's perception of the Bretton Woods institutions, the UN and the patchwork of ad hoc groups such as the G7 and G77 that have evolved since World War II. The EU is a good example of nations coming together voluntarily and accepting a degree of relinquished sovereignty. Without this degree of integrated global governance, it will be impossible to reverse environmental degradation and climate change.
- Demand that the current G8-led reform of international financial institutions goes beyond financial regulation challenges but also redresses the political and market failures that contributed to the phenomenon of climate change in the first place. This means regulating markets so that they work to price the real economic impact of the relentless release of carbon into the atmosphere.
- Encourage nations to introduce a common preamble into their constitution that declares an inseparable belonging to the wider natural, economic and security systems. Although a major effort, this action would allow citizens to adopt a wider identity, a wider "we", which would help legitimize agreements and policies that demand the participation in solidarity with the welfare of the whole world and the Earth.
- Support, through principles defined in the agreement, global governance mechanisms that stimulate the evolution and innovation of new economic policies, new business models, new technologies, new markets and knowledge development priorities. Visionary leadership that promotes these must describe a future not of constraint but of opportunity for welfare, equity, security and human development and economic growth in a society that is both local and global, and where the laws that govern human affairs are in harmony with the laws of nature.

Postscript

The myth of progress: Are we facing the wrong direction?

For a “blink of an eye in history”, humankind thought that there were no limits, or boundaries as to what rationality and reason could produce: this was the myth of progress. The thinking and hence the design of policies, economies, technologies and even of nations, over the last three hundred years has been dominated by our increasing hubris. We thought that the power of human logic would be the dominating force of the universe. The disappointing conclusion is that we, in good faith, have taken our civilization to the brink of the abyss. The idea that linear hierarchical, sequential, cause and effect logics, reductionism and fragmentation and the blessing of competition would foster a *perpetuum mobile* of material growth, have all proven to be wrong. We are at the end of this road.

We have to rethink the principles upon which we base the development of our economy, technology and governance. Nature is what it is. We cannot negotiate with nature to change its nature, its processes, and its chemical and physiological characteristics.

Our geopolitical and industrial world is a fragmented amalgam of growing conflicts of interest. There is no system of governance that legitimately represents the whole. Distrust has become a constituent part of our political and economic logic and models. Fear and aggressiveness is the dominant behaviour, not trust and togetherness. Fear is a driver of disintegration, fragmentation and violence. Is this a political vision of our future? Is it at all possible to pull it together and make an about turn towards a better future?

Living within the planetary boundaries

In 2009, the Tällberg Foundation will make an effort to formulate a tangible vision that it is possible to turn the tide of human destabilization of the earth systems. The Tällberg Forum 2009 will respond to the question: “How on earth can we live together? Living within the planetary boundaries.”

In concrete terms, we will define the parameters of a new Global Contract that resurrects the moral imperatives upon which we can safely design systems for value creation that respect the stability and predictability of the Earth’s natural systems. This takes both business and politics beyond the concept of responsibility embodied in the Global Compact, an initiative that originated in Tällberg during meetings held in the 1990s.

This vision of responsibility for “the whole” should also be the vision for the post-2012 negotiations and for the agreement that we very much hope will be signed in Copenhagen in 2009.

List of sources

Anderson, K L., Bows, A. 2008. Reframing the climate change challenge in light of post-2000 emission trends.; Philosophical Transactions of the Royal Society - A: Mathematical, Physical and Engineering Sciences. Vol: 366. No.: 0. pp 3863-3882

Bauer, P., Athanasiou, T., and Kartha, S., 2008. The Right to Development in a Climate Constrained World: The Greenhouse Development Rights Framework. Heinrich Böll Stiftung Publication Series on Ecology, Volume 1.

Canadell et al., 2007. Contributions to accelerating atmospheric CO₂ growth from economic activity, carbon intensity, and efficiency of natural sinks. PNAS, 104 (47) : 18866 - 18870

European Commission, 2008. Interim Report on The Economics of Ecosystems and Biodiversity (TEEB) http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/teeb_report.pdf

UNEP, 2007. Global Environment Outlook 4 (GEO-4)

Hansen et al., Dangerous human-made interference with climate: A GISS modelE study, Atmos. Chem. Phys. 7, 2287 (2007).

Hansen et al., 2008. Target Atmospheric CO₂: Where Should Humanity Aim? [http://www.columbia.edu/~jeh1/2008/TargetCO₂_20080407.pdf](http://www.columbia.edu/~jeh1/2008/TargetCO2_20080407.pdf)

IPCC Fourth Assessment Report, 2007. <http://www.ipcc.ch/>

Lenton, T.M., Held, H., Kriegler, E., Hall, J., Lucht, W., Rahmstorf, S., Schellnhuber, J., Tipping elements in the Earth system, PNAS, 105 (6): 1786-1793

Millennium Ecosystem Assessment, 2005

Ramanathan, V. and Feng, Y., 2008. On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead. PNAS, 105 (38): 14245 - 14250

Schellnhuber H-J, Held H 2002 in Managing the Earth: The Eleventh Linacre Lectures, eds Briden J, Downing T (Oxford Univ Press, Oxford), pp 5–34. (source for Figure 2)

Sorteberg, A. University of Bergen, Norway, data from Snow & Ice Data Center, Boulder (source for Figure 1)

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“I very much endorse, wholeheartedly agree, and find the booklet compelling and urgent.”

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“We desperately need the reason of science to combine with the commitment of leadership. So take the agenda of this powerful book from the Tällberg Foundation and make it your own. Act now. Tomorrow may just be too late.”

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“Constructive input to the global discussion, such as the ‘Tällberg Provocation’, is to be welcomed. We must be ambitious and honest. Fundamental questions about our society and our economy must be asked, and answered.”

Professor Jacqueline McGlade, *Director, European Environment Agency, Denmark*

“The Tällberg Provocation outlines specific considerations that should underpin international negotiations towards an equitable post-2012 agreement and is a valuable contribution to the search for equitable, effective, and enforceable action.”

Mohamed El-Ashry, *UN Foundation, USA*

“This is a provocation in the best sense, in two crucial ways: First, it brings in scientific work in progress on planetary dynamics indicating that avoiding dangerous global warming will become a terribly close race between society and nature. Second, it drives home the fundamental message: climate change management – through mitigation, adaptation and development – is ultimately an ethical issue.”

Prof. H.J. Schellnhuber CBE, *Potsdam Institute for Climate Impact Research, Germany*

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