

Governance, Science and the Climate Crisis
International Environment Forum
Proposal to Together First, January 2020

The International Environment Forum (IEF) proposes launching a campaign with others to strengthen the science-policy interface in the United Nations (UN) system with formal links to decision-making processes, with a major focus on the climate crisis, in order to overcome the inertia of present governance mechanisms. This will also mean new efforts to explain the challenges and their ethical implications and to build public support for actions, including at the local level. Since the General Assembly can create subsidiary advisory bodies without approval required by the Permanent Members of the Security Council, we can try to build sufficient momentum among interested countries, supported by adequate public pressure, to strengthened scientific advisory bodies and their role in the UN.

The main risk addressed is the failure of political processes at the national and global levels to truly listen to scientific warnings about climate catastrophe, biodiversity collapse, pollution impacts and other environmental threats. While they do pay attention to scientists and adopt global goals for transforming the world in a more sustainable direction, they continue in practice with business as usual. The science of complex systems shows that all these risks are interlinked, and could lead to a complex catastrophe with major social and economic consequences as well. The interest created in improved global governance during the UN 75th anniversary could create opportunities to push this issue as part of wider UN reform. One early aim should be to give the United Nations Framework Convention on Climate Change (UNFCCC) the power to identify binding limits on greenhouse gas emissions that would be required to meet the objectives of the Paris Agreement and to negotiate their equitable distribution.

Given the difficulties in the UNFCCC and the number of governments that are turning away from multilateral action and even from accepting scientific realities, it will be a challenge to build support in some countries for strengthening scientific advisory mechanisms. Political will in too many countries is linked to powerful economic interests, political expediency and ideological positions that resist change, and decades of science advice have done little so far to alter this. There is also the common focus on short-term national interests in the political and diplomatic machinery of governance.

However, many other countries are setting objectives and targets, parts of the private sector see responding to the climate crisis as a good business opportunity, and consumers are shifting their life-styles and demand. Public acceptance of the changes required to respond to what science is revealing about the havoc done to natural systems is generally more widespread, especially among the young, as the calls for climate justice demonstrate. The potential is there for a widespread movement to accelerate change, both to bring the advice and knowledge of scientists more directly into global decision-making, and to work around the obstacles that some countries will certainly try to put in the way.

One need is to move from science as the source only of negative news and warnings of disaster, to a source of positive solutions and visions of the better world that can emerge from the necessary economic and social transition. This can be coupled with ethical arguments around justice, equity, solidarity and moderation in lifestyles that can also build wider support in civil society, youth movements and faith-based organizations. Given the the acceleration of the climate and biodiversity catastrophes, there is no rational alternative to the ultimate adoption of these proposals if we want a dignified life for future generations on this planet.

Strengthening the role of independent scientific advice can increase the effectiveness of governance in the fundamental transformation required to move towards sustainability, and reduce the rapidly-accelerating costs of inaction. We need to develop arguments that listening to the knowledge that comes from science, and experience in the form of indigenous and local knowledge, leads to better outcomes, and build momentum for reform. Some countries are leading the way, and they will demonstrate that transformation is both possible and beneficial. Accelerating climate change impacts and the consequences of collapsing biodiversity will ultimately force governments to change their position, so making rational arguments now will facilitate this. There has already been a significant shift in public opinion in recent years, so further improvement in the next five years is certainly possible. The challenge is to channel that into institutional change at the global level, but there are also positive proposals for this that can gain momentum.

For the IEF, as a small organization operating without funding, this will be implemented through:

- Information on our web site, newsletter and outreach to our members;
- Participation in major events in partnership with others (ebbf-Ethical Business Building the Future, Together First, Global Governance Forum, Baha'i International Community, etc), including at the United Nations and COP 26;
- Contributions to our major group, the Scientific and Technological organizations, in collaboration with the International Science Council;
- Preparation and distribution of statements on social media and in video clips;
- Contribution to on-line courses on climate change and other educational activities;
- Empowering our members and others to take action in their local communities.

We can only do a small part of what is required, and welcome partnerships to extend these activities.

Science and governance

As an organization predominantly of scientists, we see the importance of the science of complex systems and an integrated perspective on the multiple challenges facing the world, including the climate catastrophe, the biodiversity crisis, the degradation of natural resources and irresponsible approaches to pollution and wastes on the environmental side; inequality reflected in extremes of wealth and poverty, migration, fragmentation and extremism on the social side; and a materialistic economic system plundering the planet for the benefit of the few while leaving most of the population behind. We contributed to the formulation of the Earth Charter as well as the 2030 Agenda and actively support the Sustainable Development Goals. But scientific knowledge, by itself, does not change individual behaviour or guide system change. From our Bahá'í-inspired perspective, the ethical dimension of human values and a vision of a higher human purpose are required to motivate change and to bring people to accept short-term sacrifices for the long-term common good, learning to live within planetary boundaries. We see changing values as fundamental to progress, and scientific and ethical approaches as complementary. We need to create momentum from many stakeholders beyond the scientific community for a strong voice for science in UN reform and responding to the climate crisis.

For environmental risks such as the climate crisis and the collapse of biodiversity, natural science is the primary warning mechanism, allowing us to learn of the impacts of our actions, but it still has too little impact on decision-making in the UN or on fundamental systems change as required by the 2030 Agenda. We need to work to change this. Two of our members shared in the 2018 New Shape Prize of the Global Challenges Foundation for their proposals on global governance, and many of our members are scientists working at the science-policy interface, so we can speak from experience. We also have an interest and experience in strengthening the role of science at the local level, building local responsibility, resilience and innovation.

Strengthening science in policy-making

Some of the most urgent global crises today are environmental, including climate change, biodiversity loss, chemical and plastic pollution, and resource destruction, in which scientific knowledge plays a defining role. Yet scientific advisory processes are fragmented, limited in scope, and often with little impact on policy and decision-making, whether at the local, national or global levels of governance. Greta Thunberg's message has been to listen to the science. We propose that the partners in Together First launch a dialogue with all the relevant stakeholders on how to create scientific and technology assessment processes where they do not exist and to increase the effectiveness of those that are already in place in contributing to better governance of catastrophic environmental risks. This could ultimately lead to institutional changes to incorporate scientific advice more comprehensively into governance at all levels.

One of the significant failures of governance in the modern era is the inadequacy of arrangements to ensure that scientific advice is properly considered in policy-making. Few politicians have scientific or technical training, scientific reports are often not in the most accessible language or easiest to access, and for most decision-makers, scientific information about environmental risks, if available, is just one factor to be weighed against political, economic or ideological interests which usually take precedence. Even the concepts of expertise, independent scientific knowledge and truthfulness are increasingly questioned. Determining what is true or correct becomes a matter of political expediency.

Risk identification and assessment is largely a scientific process, and scientific research is generally the human activity that first identifies new risks. One problem at present is the long time it takes for research to be undertaken and formally published, confirmed by other research, communicated effectively to the public and decision-makers, accepted as requiring a response despite resistance from special interests that may be harmed by any action taken, incorporated into the necessary institutions and regulations, and effectively enforced at the global level, while problems are accelerating. The latter steps in this process are still weak if not entirely lacking in present global governance. Scientific advisory processes need to be built into every relevant part of the UN system. This proposal would help to build momentum for improvements in this area, reinforcing the many other efforts that need to go in the same direction.

While the focus of this proposal is on the climate crisis as one of the most urgent priorities, the resulting strengthening of the science-policy interface in the UN and other international organizations will serve as a model for a similar response to other threats such as pandemics and the rise of anti-microbial resistance. Similar scientific advisory mechanisms are needed to protect human health, building on what already exists in the World Health Organization, but extending them where necessary to risks not yet adequately covered. In particular, what needs strengthening is the use of that science to adopt binding regulations at the global level, and to provide the means for enforcement.

Reforming global governance

The failings to consider science in policy making at the national level are even more apparent internationally, where governments jockey for power and influence, if not dominance, in the political and economic anarchy of sovereign nations and multinational corporations. This is not to deny the important roles of science internationally, with global research programmes, international scientific assessments including the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), scientific advisory mechanisms under various multilateral agreements, and many scientific and technological organizations (including IEF) accredited to the United Nations as a major group. The

problem is more the disconnect between the available scientific information and the actions taken by governments, businesses and other actors. For example, despite more than 30 years of increasingly pressing warnings about greenhouse gas emissions and climate change, and commitments by governments to take action through the UNFCCC and the Paris Agreement, among others, emissions are still rising, fossil fuel companies plan major increases in exploration and production, and the damaging results of global heating are accelerating. Voluntary agreements and the good will of some actors are outweighed by those profiting from business as usual, as shown by failures at the UNFCCC Conference of the Parties (COP25) in Madrid.

The only solution, in a globalized world and economy hitting if not overshooting planetary boundaries, is more effective global governance. Yet the UN is increasingly seen as ineffective, multilateralism is often denigrated, and many countries are retreating within their borders under populist and nativist pressures and a rise of autocratic if not despotic rulers. The forces of disintegration, coupled with the climate crisis, represent existential threats to human society. The countervailing forces of integration are not yet sufficient to power the necessary fundamental transformation in human society called for in the UN 2030 Agenda.

To address this challenge and to stimulate widespread discussion of the ways forward, Augusto Lopez-Claros, Arthur L. Dahl and Maja Groff (the latter two members of IEF) have written “*Global Governance and the Emergence of Global Institutions for the 21st Century*”, being published by Cambridge University Press on 23 January 2020. They consider the deficiencies in the UN going back to its creation 75 years ago, and propose the reforms necessary to make it fit to address not only peace and security, but also all the problems that have emerged since its founding, many of which are best understood from a scientific perspective. The proposals extend to the global level those elements of governance that are generally taken for granted at the national level, with legislative, executive and judicial functions and means of enforcement, and they won the New Shape Prize of the Global Challenges Foundation in 2018.

In brief, the General Assembly would have proportional representation, and the capacity to adopt binding legislation on global issues including peace, security and the global environment. An Executive Council with a management function for the UN system would replace the Security Council, and oversee an International Peace Force. The International Court of Justice would have binding jurisdiction, complemented by the International Criminal Court, an Anti-corruption Court, and a Human Rights Tribunal. Various scenarios are discussed for ways forward. If some present Permanent Members block UN Charter revision, then a Charter replacement conference could be held to establish a new and more effective organization, which could then merge with those parts of the present system worth preserving. Once an international legislative process is in place, the way would be open to adopt coherent legislation for environmental issues like climate change, biodiversity loss, chemical management, and protection and management of the global commons.

Scientific advisory processes

The book makes several proposals to formalize scientific inputs to drafting legislation and other elements of global governance. Scientific advisory processes would be strengthened and made more coherent, building on the present IPCC, IPBES and scientific advisory bodies under the various conventions, with direct links to the General Assembly. A science office in the UN would provide authoritative advice on the state of the planet, and monitor trends, planetary boundaries, and system interactions.

A strong technology assessment process would be added to consider issues such as geoengineering for climate change mitigation; the threats to biodiversity from the release of genetically-modified organisms and new creations; the impacts of present and proposed releases of chemicals, plastics,

nanomaterials and other novel substances; access to and security of information and communications technologies, and their misuse in damaging manipulations of public opinion; and uses of artificial intelligence, among others. It would assess their risks, and propose legislation to the General Assembly that would be required to minimize risks and encourage beneficial uses. For example, an independent science-based global mechanism is needed to review research in the field of genetic modification, to screen proposals to release GMOs into the environment, to authorize those that meet essential criteria of safety and usefulness, and to monitor releases for unexpected side effects, just as is done with medicines. Global governance must provide for the capacity to use this scientific advice to regulate and if necessary prohibit technologies with substantial risks, applying the precautionary principle.

A second Chamber for Civil Society would be created, advisory to the General Assembly, building on the present major groups and stakeholders, and formalizing their role in considering the global common good and the views of multiple stakeholders as inputs to the legislative process. In this chamber, the scientific and technological community would be able to interact with other groups and explore innovative solutions to problems as they arise.

These science-based reforms would give the UN the capacity to identify and hopefully manage global catastrophic risks. A global consultative process operating on the basis of scientific evidence and driven by considerations of the public global interest (rather than allegiance to narrower priorities based on national sovereignty) would change the current dynamic of large-scale inertia on the part of governments and help them to rise to confront the critical problems that we face.

Global governance of the environment

Global environmental challenges demonstrate the need for a strengthened global capacity for environmental governance, whether in one or several specialized agencies, supported by international scientific advisory and technology assessment processes designed to be protected from partisan national interests and industrial lobbying. This should cover climate change and ocean acidification, energy, atmospheric pollution, dangerous chemicals, wastes such as plastics impacting the environment and human health, biodiversity and ecosystem services, and the global dimension of natural resources management. Some flexibility will be needed to take on new environmental risks that may be identified in the future. The many existing environmental programs, conventions and other bodies should be gradually integrated into this framework, retaining their competences and successes while reducing fragmentation and overlap. There will be a growing need for environmental restoration, requiring a global agency for knowledge sharing, technical assistance, and financial support to repair the damage done to our life support systems by the pillage of our planet by past and present economic activities.

One requirement of environmental governance is ensuring that the scientific input to policy-making is adequate and independent, that the risks and uncertainties are presented correctly, and that sufficient attention is devoted to long-term as well as short-term societal priorities. This requires coordinated and sustained research, monitoring and scientific advisory procedures appropriate to each environmental process, with structures for multilevel governance at the scales most relevant to each characteristic or problem. Decision-makers also need to be scientifically literate to be able to understand scientific advice.

Climate change is a complex and diffuse risk that has long seemed somehow to lie outside short-term priorities. Because of its political sensitivity and economic implications, scientists have tended to make conservative evaluations of the scientific data, while there have been unanticipated accelerations in various scientifically-monitored processes. It is not easy to assess the probability of tipping points beyond which runaway processes become uncontrollable and with timing that is

uncertain. For climate change, science will need to determine the planetary limits for greenhouse gas concentrations as the basis for negotiations on the allocations for each country to respect those limits, as only objective science can provide a sufficient basis for the difficult sharing of responsibilities to return within those limits. The “*Global Governance*” book also discusses climate-induced migration, adaptation, ocean acidification, and the energy transition.

Similar scientific assessment processes will be needed for other global risks, such as global pollution risks from chemicals and nuclear radiation, the management of plastics and other persistent wastes, and the need to remain within other planetary environmental boundaries such as for biogeochemical cycles. The atmosphere, its composition and contaminants need to be monitored. Global governance of dangerous chemicals including pesticides, herbicides, antibiotics and endocrine disrupters, will be an obvious area to develop, producing considerable economies in overlapping national testing and regulatory processes, and filling gaps where countries do not have the technical means to manage such dangerous products.

Science needs to guide the management and equitable distribution of the planet’s natural resources and sources of energy. Global dimensions of land use, freshwater supplies, the atmosphere and the oceans will eventually need to be covered. Accounting systems need to include natural resources, assets and processes as global natural capital to be maintained for planetary sustainability, with only the interest on that capital considered an available economic resource. This will require groups of experts of the greatest knowledge and confidence, similar to those making up the IPCC, in all the relevant domains.

Another issue is biosphere integrity, and the need for a coherent approach to the protection and ultimately restoration of the biological heritage of the planet and the integrity of the biosphere on which we all depend for survival. This includes both the functional diversity of ecosystems and life support systems, and genetic diversity represented by species and genetic resources. Saving what is left and eventually trying to restore essential ecosystems will require international efforts beyond the national capacity of many countries. Global levels of coordination, scientific research and advice, and often financial support, will be necessary to assist countries to preserve what is left of their natural heritage.

The book also covers the challenges presented by population growth, carrying capacity, age distribution and migration. A scientific foundation is needed for the larger issues of the human carrying capacity of the planet, the relationship of population to resources, and questions of population concentration and movement.

Focus on the climate crisis

The climate crisis is, together with the linked collapse of biodiversity, the most urgent environmental catastrophic risk. Despite the best efforts of governments through the UNFCCC, informed by the IPCC, government action is inadequate if not actively negative. The progress in building a spirit of multilateralism to address this issue that reached its peak with the signing of the Paris Agreement ((PA) in 2015 is dwindling, as the failure of COP25 to make significant progress shows. The analysis of countries’ announced voluntary commitments shows they are vastly insufficient to reach the objectives of the PA. We must push for the next step to binding and enforceable reductions in emissions by strengthening this dimension of global governance.

Climate change, biodiversity loss, resource destruction and pollution are destroying the carrying capacity of the planet and represent existential threats that must constrain human activity and impacts. Business as usual is suicidal, as the youth are crying in the streets. This is not an issue that should be subject to political compromise, like only half shooting yourself in the head. We must

shut down damaging activities now to prevent further environmental destruction, before addressing the damage now done and eventually restoring the planet's carrying capacity in the future. Of course, this means transforming everything from energy and transport systems to food production, industrial processes and infrastructure, not to mention individual lifestyles, but the costs will be less than the damage now occurring, and this will boost the economy despite the pain of the transition.

The climate crisis is an existential threat. Governments decided together in Paris to set a goal of well-below 2 degrees and preferably 1.5° of global heating. This is a values-based choice informed by science but also by the experienced reality of all those living on low islands, among others. It is essential that governments show that they are trustworthy and keep the agreements they have made, strengthening the rule of law. The recent failure of COP25 to make significant progress on finalising the last elements of the PA's rule book and urging for strong upgrading of mitigation ambition in countries final PA commitments to be shared in 2020 shows how important this year will be. Certainly the threat of ecological havoc argues for stronger global governance, but we need a more organic pathway towards gaining the trust of the people to accept such a system. The present trend is to reject multilateralism, and as governments discredit themselves, citizens will turn more and more against any authority whatsoever. Their fundamental trust in scientists, public servants, and leaders has to be re-established.

The IPCC has emphasized the urgency of action on climate change, so all avenues need to be pursued simultaneously. While action at the global level is lagging, implementation at the national and local levels must be the foundation for further action. Ultimately international law must be strengthened as the only solution to bring the planet back to a habitable space for human society.

The immediate concern is getting the current Paris Agreement implemented, not so much through one fix at the global level, but through an organic change from bottom up. The willingness to subject national self-interest to the common global good must grow from both leaders and citizens. The focus should be on multilevel governance and on ensuring national policy processes take international commitments seriously, requiring more than a legal perspective. We need open and transparent governance and implementation, with connections between and across layers of governance. Political will is mostly lacking and requires pressure from the public. The gaps are at the community and national levels where work is needed. The 2030 Agenda and its Sustainable Development Goals provide a broader framework beyond the Paris Agreement, within which we should work, integrating the social, economic and environmental dimensions. We need consultations among people and national and local governments. How do we identify our own responsibility regarding the global carbon budget? What is fair? What is possible? These are questions that we all need to discuss at every level and identify the underlying core ethical principles. What is important now is institutionalising an open participatory process to do this in every country.

Given the urgency of action on climate change, everyone in the world needs to be informed. Even the small impact of an organization like ours, with messages that resonate with people's values and motivation, may help to increase consciousness of the worst climate risks. If this can become a theme across many other partners, it could have significant impact. The advent of any major crisis would make decision-makers and the public more receptive to these messages if they have heard them in advance.

The well-grounded scientific advice from the IPCC provides an objective basis for setting planetary limits for greenhouse gas concentrations, but it does not have a mandate to propose solutions. The institutional challenge is to turn the planetary boundary into binding emissions limits for each country and other relevant entities such as corporations. Mechanisms for determining the criteria for

responsibility and allocating shares equitably are the next step forward in strengthening the global response to the climate crisis.

The requirement that governance decisions need to take into account objective realities as defined by science provides an additional measure of accountability. Everyone can see whether the actions taken will deliver what science requires, or fall short. In the case of the climate crisis, it was already obvious in the Paris Agreement that the announced Nationally Determined Contributions to greenhouse gas reductions would fall far short of the goal set in the Agreement and a ratcheting mechanism was incorporated in the Agreement to pressure governments to increase their commitments in subsequent periods. Such voluntary mechanisms are clearly not up to the challenge that climate change represents. The next steps need to be to allocate reduction targets to countries based on the science and agreed principles, and then to make meeting those targets binding, with penalties for falling short, in a more strict form of accountability.

The pressures on populations from the impacts of climate change can lead to conflict and political violence. Prolonged drought in Syria drove rural populations to the cities, identified as one of the causes of the prolonged Syrian conflict. If plans are not made to anticipate and organize the massive displacements of coastal populations from sea level rise, and people fleeing drought and extreme heat that will make regions uninhabitable, conflict and violence are certain to increase massively. Adequate scientific assessment can identify the areas and people at risk, so that their forced displacement can be anticipated and organized without excessive human suffering. Efforts will also be needed to determine the countries with resources to receive these migrants and to educate the receiving populations to welcome them rather than reject them.

Climate change is also one of the major threats to ecosystems and biodiversity around the world, with one estimate suggesting that 2°C of global heating would threaten 20 percent of global biodiversity, and a 4°C rise would exterminate half of the world's biodiversity. The IPCC has already warned of the continuing collapse and possible extinction of coral reef ecosystems around the world. Climate action can also help to resolve the biodiversity crisis, beyond simply valuing and conserving nature. The third and fourth aspects of the 2050 vision under the Biodiversity Convention are sustainable use and restoration. At present, intensive agriculture is depleting soil carbon, while land conversion, deforestation and coastal development are destroying natural carbon sinks rich in biodiversity. A shift to sustainable use and even restoration can turn carbon sources back into sinks and remove carbon from the atmosphere. The available data on ecosystems and biodiversity are inadequate and much more difficult to collect, requiring significant investment in scientific research, monitoring and assessment to prevent crises being discovered too late to be corrected. A coherent multinational scientific assessment and advisory process for biodiversity building on the IPBES is thus a priority to be included in the effort to increase the use of science for global policy-making.

Climate governance

Climate change governance, because of the urgency and impact of the climate crisis, as well as the strong and objective scientific justification for action, could be the first step towards broader global governance reform. Once some trust is built in the equity and effectiveness of constraints on national sovereignty in the global common interest in this narrow area, the way will be open to extending the experience to other areas of global risk.

Ultimately, the transformation towards a low-carbon society should be embodied and guided by new institutions of global governance, replacing national sovereignty by national autonomy, with institutions at the global, national and local community levels that work in a coherent and integrated way guided by subsidiarity as an essential principle for the allocation of responsibility. Governance

should cover the economic system to ensure that it serves the common good, incorporating strong scientific advisory and technology assessment components to protect the planetary environment, and providing the ethical framework to guarantee human rights and institutions of service to society meeting everyone's needs.

What would be the aims of a global governance approach to the climate crisis? The science is clear on the impacts of greenhouse gases, the resulting global heating on the climate, and the global heating potential of each gas. There are also reasonable estimates of the emissions for each greenhouse gas, including carbon dioxide, from different types of human activities, and, therefore, of national contributions -- past, present, and projected -- to global heating. It is thus possible to set limits for greenhouse gas concentrations in the atmosphere beyond which any particular acceptable level of human-induced global heating, presently estimated as 1.5°C above the pre-industrial level, would be exceeded. Model scenarios can calculate the emission reductions necessary to stay below that limit, or trajectories that might include overshooting the limit but then, by extracting gases from the atmosphere, come back to the limit. Of course, there are uncertainties around tipping points in the planetary climate system which could produce self-reinforcing feedbacks, such as releasing the methane stored in permafrost and undersea methane hydrates, resulting in runaway global heating. The precautionary principle requires that we avoid approaching such uncertain tipping points, although there is some evidence that we may already have passed the point of no return. New proposals for a Climate Risk Governance Commission could help to take the debate forward, lifting it above political and ideological debates.

A global governance mechanism would need to determine an equitable allocation among countries of the reductions required to collectively respect global limits. This might include a consideration of historical contributions to the problem, present emission levels, the financial capacity to cover the costs of emission reductions and investment in alternatives, the technical capacity to plan and install alternatives, the governance capacity to manage and enforce the transition, the anticipated costs of adaptation to changes already underway that must be budgeted for, vulnerable populations to be protected, and the local availability of renewable energy resources that could be developed. Some consideration would also be needed to determine the liability of high emitting countries for the damage their emissions are causing to other countries. Liability and compensation are highly political issues with historically high emitters refusing to admit responsibility, knowing the financial consequences. The allocations of emission reductions so determined would need to be supported by binding global legislation, with incentives for desirable new investments and penalties for countries, corporations and other actors who fail to respect their allocated limits. This also means appropriate enforcement and dispute settlement mechanisms.

There are other ethical and practical dimensions of the transition to more sustainable energy, food production, and industrial systems that will need to be considered. Countries with weak capacities will need to receive outside support in the common interest. Workers and communities that have depended on emitting industries and damaging activities for employment and income will need to have alternatives developed for them. There are always winners and losers in any change, and if the losers are not offered another way forward, they will resist the change. Major parts of most economies will need to be reoriented in new directions.

Another role for global governance will be in organizing the adaptation of our planetary society to the climate changes already underway, in anticipating their consequences, in acknowledging the need for solidarity with the victims, and in acting preventively to reduce human suffering. A sea level rise of half a meter is already locked in, even if strict emission targets are met. Thus, some island nations will become uninhabitable and disappear, and around the world many coastal populations will be displaced. Organizing the moving and settlement of displaced populations with no hope of return, estimated at hundreds of millions, will be a global challenge. Where is there

room to receive them? How will new communities be built for them? What employment opportunities can be created for them? How can their cultures and social capital be safeguarded? Who will pay for all this? The rich have caused the problem, and the poor are the first victims.

From the perspective of building better global governance, addressing the climate crisis could be an important precursor. The scientific evidence is clear, the ethical responsibility evident, and the alternatives unthinkable catastrophic. Turning the UN Framework Convention on Climate Change into an institution with the capacity to adopt and enforce binding legislation and to negotiate the equitable sharing of responsibilities both for emissions limits and financial compensation, which would be a significant step beyond the 2015 Paris Agreement, could be the first example of just and effective global governance in one narrow area. As governments see the obvious benefits and the equitable sharing of costs from such an approach, and as they learn to trust each other as well as the supranational institutions that they create, a first step will be taken that could subsequently be enlarged to other domains requiring global governance. The European Union started as a simple coal and steel community before gradually expanding its scope. Action to prevent a climate catastrophe could serve as a similar example at the global level.

Building motivation

The environmental message from IEF will be that science identifies the planetary boundaries, the crossing of which has serious consequences. The international society has set clear objectives in the PA that would limit, but far from eliminate, these consequences and scientists have been asked to support this by laying out the possible pathways to reach those goals. However, science cannot be the moral compass to decide which pathways we should adopt. Science is a wonderful tool to enable us to become aware of how we are destroying the natural world and what kind of governing institutions would be effective, but it does not dictate what we should do. Societies do that together, based not only on scientific knowledge in its present exclusive connotation, but on a broader knowledge generation enterprise that should encompass all of humanity. The social, economic and environmental lines of action are complementary and mutually reinforcing. They all require a major effort at motivation, whether in building political will, listening to the science, or abandoning economic fetishes and false assumptions and turning dislocations to positive ends. We are collaborating with the Global Governance Forum in supporting its comprehensive proposals for reforming the UN system, including recommendations on scientific advisory processes and climate change.

Our efforts will be asking how to use the accelerating crises (whatever they may be) to power positive change, to remove roadblocks and to enable the necessary transition. How do we reset our priorities to respond to the present challenges? How do we get from here to there? Our discourses will raise the questions to ask and the assumptions to challenge. We shall encourage learning from experiments, promote examples of working alternatives, and suggest positive directions for the future. Since there will be surprises ahead, we shall highlight the need to build resilience in all systems and communities. Can we reduce vulnerabilities in our food and water systems, our energy supplies and communications, our local economies and institutions? How do we give young people hope in the future and the motivation to work for positive change despite the difficulties? We shall target all levels, with a focus where our competencies lie at the local and global levels. In keeping with our purpose and expertise, we shall emphasize the complementarity of scientific and ethical/spiritual dimensions of the issues, and encourage collaboration with faith-based organizations.

Education for transformation

Any effective approach to governance needs to consider the role of education. Formal educational systems should teach a proper understanding of science, complex systems and integrated approaches, and ethical values that favour solidarity, cooperation and service to the common good.

One foundation of science is the basic principle of access to knowledge for everyone. Education both conveys knowledge and teaches how to access it. Global governance must ensure that every person on the planet can acquire the knowledge needed to be a constructive and informed member of society. Every community should be invited to collect, preserve and transmit the knowledge of its history, culture, arts, science, agriculture and industries, and every nation has its own rich heritage. The advancement of science depends on the free exchange of knowledge, in which everyone, everywhere should participate. An evolving global civilization will increasingly reflect the knowledge required to live peacefully and sustainably on this planet.

Access to science

One specific issue that needs to be addressed is inequality in access to scientific information and to knowledge in general. The abuse of the concept of intellectual property by large multinational scientific publishing houses and other corporate interests for profit has resulted in the privatisation of the commons of scientific knowledge. If scientists want to publish their findings in reputable journals or books, they must sign away their intellectual property rights to the publisher while receiving no remuneration, only the recognition that comes from having their work read by others. In some cases, they must pay high page charges for open access. Peer reviewers also contribute their knowledge and judgment without any personal benefit as part of the open culture of science.

Currently the major scientific publishers have bought up the journals of scientific societies and consolidated into a few large multinationals. Expensive books and journal subscriptions go only to the best-endowed university libraries. Individual scientists outside such institutions, or in economically disadvantaged countries that cannot afford to buy the literature, can access the scientific literature online, but only by paying a high fee to read each article, even those that they have authored, which is generally beyond their means. This recent privatization of scientific knowledge effectively restricts cutting-edge science to only the wealthiest countries and researchers in institutions. A new kind of scientific poverty is thus spreading around the world; this trend must be actively countered and reversed at the international level to ensure the steady advancement of science, access to knowledge in general, and innovation at the global level. There is a counter-movement toward open access, but it still covers only a fraction of the scientific literature, and not the most significant part.

This has become a global problem and requires solution through improved global governance of scientific knowledge in the common interest. The response to many catastrophic risks will in many cases require diverse approaches at the local level adapted to each particular situation, for which local and regional scientific capacities need to be developed, supported by the flow of information from the global level. Science needs to be accessible to everyone.

Conclusions

While this proposal focusses on the short term, our vision includes all three time frames. In the short term, we encourage our members to work on community motivation at the local level and through their own networks, while trying to stimulate global discussion of the need for improved science-based global governance and UN system reform, profiting from [UN@75](#), COP26 and the 50th anniversary in 2022 of the Stockholm Conference, for which environmental assessment was a major theme. In the medium term, the aim is to formalize scientific advisory processes in existing decision-making mechanisms, and especially to strengthen global governance for climate change as

the best issue to leverage wider acceptance of scientific inputs to governance. The long-term focus is strengthening the rule of international law through UN system-wide reform incorporating scientific advice at the heart of global governance.

There is an immediate need for a wide international debate on the role of science in governance at all levels, especially at the global level, for pressing environmental problems. Many of the proposals above can start to be implemented immediately without waiting for fundamental reform in the UN system. The scientific community itself can consider how to coordinate and improve its inputs to policy and decision-making processes, in collaboration with other civil society organizations. Other organizations can complement this by translating the scientific messages into more accessible language and taking them to their wider constituencies. For decades we have disregarded the warnings of science and the limits to growth. The planet itself is now telling us that time is now short and a fundamental transition is our only path to a sustainable society.