From the Editor, Request for information for upcoming newsletters

This newsletter is an opportunity for IEF members to share their experiences, activities, and initiatives that are taking place at the community level on environment, climate change, and sustainability. All members are welcome to contribute information about related activities, upcoming conferences, news from like-minded organizations, recommended websites, book reviews, etc. Please send information to newsletter@ief.org.

Please share the Leaves newsletter and IEF membership information with family, friends, and associates and encourage interested persons to consider becoming a member of the IEF.

Members Corner

Welcome
We warmly welcome the following new members and associates to the International Environment Forum:

New Members
Alessandra Esposito, Switzerland
Ehsan Vossough, Australia
Komal Kumar Javarappa, Finland
Amy Loder, USA
Terra Sprague, United Kingdom
Abu Raihan Md. Zobayer, Bangladesh
Ashish Kumar, India
Muhammad Taqui, Pakistan

New Associates
N. Ahmed, Yemen
Warren Houghton, United Kingdom
Edie Rose, USA
Carrie Alena Smith U.S.A

We look forward to getting to know you better and invite your active participation with IEF!
The Climate Crisis and Global Governance
Blog by Arthur Lyon Dahl

Sixteen-year-old Greta Thunberg has done what more than 30 years of science have largely failed to do -- she has pushed the climate crisis to the top of the international agenda. Her plea for action at the opening of the UN Summit on Climate Change Action(1) drove home what she and millions of striking students have been saying for the past year: we need actions, not more words, with no time to lose. The present generation is enjoying the short-term benefits of postponement, and the youth will reap the consequences.

The Intergovernmental Panel on Climate Change, representing the best science available, has said as much. Its recent Special Reports on the 1.5°C target(2), land(3), and oceans(4); have driven home, as never before, the crises we are facing and the catastrophic consequences of failing to act.

Those presently in power could be considered guilty of crimes against humanity, only in slow motion, as small island states vanish, coastal cities drown, and hundreds of millions are displaced by sea level rise, by extreme storms, and by persistent drought. We are trapped in an economic paradigm requiring endless growth in material consumption. The pursuit of profit by multinational corporations justifies any means in a globalized economy with no global governance. Corrupt governments hide behind a smokescreen of national sovereignty. The vested interests in the present system, both economic and political, control the levers of power and are doing everything in their power (which is considerable) to prevent change.

This is an existential challenge threatening civilization as we know it. For over a century, we have been living off of the cheap energy subsidy from fossil fuels, and our continued release of massive quantities of greenhouse gases is leading to climate catastrophe. Alternative energy technologies exist and could be scaled up rapidly, but we need to transform our existing built infrastructure, our transportation systems, our food production, our industrial processes and our individual lifestyles. This would be a massive challenge even if everyone was fully committed to making the changes required. When faced with the headwind of denial, resistance, and inertia, we are failing to turn the corner.

Behind all of this is the clear fact that the climate crisis is a global problem requiring global solutions, not each sovereign nation going it alone. Climate change does not respect borders, and damaging emissions in any one country have global impacts. There could not be a clearer justification for global governance in the common interest.

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 feedback, 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.

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(5). 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 unthinkably catastrophic. Turning the UN Framework Convention on Climate Change into a body 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 a 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.

References:
5. Ibid.
From the Front Lines of Climate Change Impact
Majuro, Marshall Islands

IEF member Carol Curtis on Majuro in the Marshall Islands reports that she experienced flooding from ocean water two weeks ago, supposedly caused by a big swell—not extreme high tides, but of course the swell and the wind caused some very high tides.

Her house is about 3 meters from the ocean side of the atoll. In the five years she has lived there, this is the first time that water has washed over part of the land. In September and October there was a little flooding with the high tides, but this time was much more severe. Five years ago, Carol's landlord built a berm of sand, rocks, and garbage by the ocean to raise the land a meter higher than the original land area. However, much of this has washed away over the last 3 months with a meter of land lost to the sea. In this area, several houses were damaged, and about 200 people had to be evacuated. They are now living in schools nearby.

This is a minor calamity compared to the big climate events occurring throughout the world, but of course it foretells the future very clearly. At some point the islands will have to be evacuated. Here is a photo of the high water mark with the rocks and debris it left behind.

The water also washed over other parts of the atoll, including the airport, and many places in heavily populated areas. This is a link to a 5 December 2019 newspaper report on the flooding of the atoll: https://www.staradvertiser.com/2019/12/05/breaking-news/huge-waves-and-disease-turn-marshall-islands-into-war-zone-health-official-says/

UNEP Emissions Gap Report 2019
Summary of key points

We are on the brink of missing the opportunity to limit global warming to 1.5°C. If we rely only on the current climate commitments of the Paris Agreement, temperatures can be expected to rise to 3.2°C this century. Temperatures have already increased 1.1°C, leaving families, homes and communities devastated. Annual emissions must drop rapidly to 25 gigatons by 2030. Based on today's commitments, emissions are on track to reach 56 Gt CO₂e by 2030, over twice what they should be. Collectively, if commitments, policies and action can deliver a 7.6% emissions reduction every year between 2020 and 2030, we CAN limit global warming to 1.5°C. Delayed action delays the inevitable. Delayed action sends the eventual price tags for sea defenses; food security; infrastructure adaptation ever higher. While we wait, emissions continue to be released into the atmosphere, and the cost and difficulty to reduce them only becomes more challenging.

HIGHLIGHTS OF THE EXECUTIVE SUMMARY

Incremental changes will not be enough and there is a need for rapid and transformational action. GHG emissions continue to rise, despite scientific warnings and political commitments, a record 55.3 GtCO₂e in 2018.

G20 members account for 78 per cent of global GHG emissions.

Although the number of countries announcing net zero GHG emission targets for 2050 is increasing, only a few countries have so far formally submitted long-term strategies to the UNFCCC
The emissions gap is large. In 2030, annual emissions need to be 15 GtCO$_2$e lower than current unconditional NDCs imply for the 2°C goal, and 32 GtCO$_2$e lower for the 1.5°C goal. Dramatic strengthening of the NDCs is needed in 2020. Countries must increase their NDC ambitions threefold to achieve the well below 2°C goal and more than fivefold to achieve the 1.5°C goal. Enhanced action by G20 members will be essential for the global mitigation effort. Decarbonizing the global economy will require fundamental structural changes, which should be designed to bring multiple co-benefits for humanity and planetary support systems. Renewables and energy efficiency, in combination with electrification of end uses, are key to a successful energy transition and to driving down energy-related CO$_2$ emissions. Demand-side material efficiency offers substantial GHG mitigation opportunities that are complementary to those obtained through an energy system transformation. 

http://www.unenvironment.org/emissionsgap
Global greenhouse gas emissions must fall by 7.6% a year for the next decade to have a chance for the Earth to stay within the limits of a 1.5°C warming. This projection is according to the new UN Environment Program Emissions Gap Report 2019. For the first time, this annual report looks at how large the annual cuts would need to be from 2020 to 2030 to stay on track for meeting the goals of the Paris Agreement.

The Guardian reports:

Postponing action could no longer be an option, said Inger Andersen, executive director of UNEP. “Our collective failure to act early and hard on climate change means we must now deliver deep cuts to emissions [of] over 7% each year, if we break it down evenly over the next decade. This shows that countries simply cannot wait.”

Without such urgent action the world’s fate would be sealed within the next few years as carbon would rise to such a level as to make dangerous levels of warming inevitable, she said. “We need quick wins to reduce emissions as much as possible in 2020, then stronger [commitments under the Paris agreement] to kickstart the major transformations of economies and societies. We need to catch up on the years in which we procrastinated.”

The escalating heatwaves, droughts and extreme storms being seen across the world demonstrated the effects of failing to cut emissions fast enough, said Kelly Levin of the World Resources Institute, who joined the UN call for action. “While there have been examples of rapid change in specific technologies or sectors, there is no precedent in our documented history for the rate of change at the scale required for limiting warming to 1.5°C [above pre-industrial levels]. We have never before witnessed such widespread rapid transitions, and they will need to be made across energy, land, industrial, urban and other systems. Achieving 1.5°C will require unprecedented transformative efforts by all.”

Rana Adib, the executive secretary of the renewable energy thinktank REN21, said: “Fossil-fuel-centred economies make it difficult for national governments to put climate concerns front and centre, with the result that globally we are not on track to meet the Paris agreement.” “This truth is hard to face. The emissions gap report shows the harsh reality: countries collectively fail to stop growth in greenhouse gas emissions. We have the necessary means to pursue the energy transition. What we need is the political and institutional will to make the transition a reality.”

The last sentence is relevant here – a plea for political and institutional will for strong climate action. That's something we often read in articles and books written by people who are well-informed and, therefore, acutely aware of the existential threat of climate change. Everyone seems to call for political will, but the calling by itself will not bring it about.

In the Promise of World Peace, a 1986 statement, the Universal House of Justice already pointed out the paralysis of will as being a major stumbling block for achieving global peace:

This paralysis is rooted ... in a deep-seated conviction of the inevitable quarrelsomeness of mankind, which has led to the reluctance to entertain the possibility of subordinating national self-interest to the requirements of world order, and in an unwillingness to face courageously the far-reaching implications of establishing a united world authority. It is also traceable to the incapacity of largely ignorant and subjugated masses to articulate their desire for a new order in which they can live in peace, harmony and prosperity with all humanity.

So, how can we overcome these obstacles? In the same statement, the Universal House of Justice explains that “good intentions and practical knowledge are usually not enough” and then emphasize the importance of spiritual principles:
There are spiritual principles, or what some call human values, by which solutions can be found for every social problem. Any well-intentioned group can in a general sense devise practical solutions to its problems, but good intentions and practical knowledge are usually not enough. The essential merit of spiritual principle is that it not only presents a perspective which harmonizes with that which is immanent in human nature, it also induces an attitude, a dynamic, a will, an aspiration, which facilitate the discovery and implementation of practical measures. Leaders of governments and all in authority would be well served in their efforts to solve problems if they would first seek to identify the principles involved and then be guided by them.

Most central to our topic is the above sentence that "spiritual principle ... induces an attitude, a dynamic, a will, an aspiration, which facilitate the discovery and implementation of practical measures."

It is evident that this “will” is not lacking in the small Baha’i communities all over the world. The Baha’i writings kindle and nurture a desire to serve the well-being of all the people of the world and to put the interests of the generality of humankind above one's personal or national advantage.

The Baha’i teachings also hold up the importance of both science and religion. Politicians and the general public need to acknowledge the reality of the climate crisis and take seriously the Emissions Gap Report 2019. This, of course, is only the first important step, but in itself it is not sufficient to engender the will for decisive action. We can only hope that the Baha’i communities all over the world will be able to assist in bringing this discourse to life by infusing it with spiritual principles.

Direct link to the report: https://www.unenvironment.org/resources/emissions-gap-report-2019
Sources: UN calls for push to cut greenhouse gas levels to avoid climate chaos, The Guardian, Tue 26 Nov 2019
The Promise of World Peace https://www.bahai.org/library/authoritative-texts/the-universal-house-of-justice/messages/19851001_001/1#883867984

The Crucial Role of Educators in Combating the Climate Crisis
By IEF Member Rafael Amaral Shayani PhD, Professor of Electrical Engineering at University of Brasilia, Brazil

Greenhouse gas (GHG) emissions hit a new record in 2018, according to the UN Meteorological Agency (WMO) report for COP25, with the energy sector being one of the major emitters of GHGs. This situation raises reflections on the importance of university education in engineering and the role of professors in reversing this situation.

It seems that concern about the climate crisis has yet to be mobilized throughout society. This crisis is one of great global proportions that can lead to important changes in temperature, and therefore, life on the planet. Nevertheless, GHG emissions continue to increase, as if the problem is far away and no immediate action is needed.

The behavior of people who consider only short-term actions, without glimpsing at the effects in the medium or long terms, has been portrayed in several literature classics. For example, in HG Wells’ (1866-1946) “War of the Worlds”, when newspapers report that Martians have attacked the Earth, the population continues its daily routine, believing that the problem will automatically be solved by Earth’s gravity which is greater than that on Mars. Then the emergency occurs and affects everyone’s lives. Likewise, Franz Kafka (1883-1924) illustrates in "The Metamorphosis" the train of thought of a person who is suddenly metamorphosed into a cockroach. His biggest concern is being late for work, ignoring a huge and more important event that will affect his entire life.

The Paris Agreement, signed at COP21 in 2015, draws our attention to the importance of integrated, holistic, and balanced non-market approaches; it also underlines the importance of capacity-building
to combat climate change. This is aligned with educator’s goals that are to build the capacity of students! However, strong technical knowledge is not enough to reverse the climate crisis! Students need to develop a holistic and humanistic vision that is critical, reflective, creative, cooperative, and ethical; that contemplates innovative and entrepreneurial performance; that recognizes societal problems; that adopts multidisciplinary and transdisciplinary points of view; that considers global, political, economic, social, environmental, cultural, safety, and health aspects; and that is committed to social responsibility and sustainable development. Such qualities for students are cited in the new National Curriculum Guidelines for Brazilian Engineering Courses, updated in 2019, which calls for innovation in the teaching approach.

The question is: how can students be motivated to apply their vast technical background to solve major problems in today’s society? The solution lies in deeply touching the student's innermost self, empowering them, and emphasizing their ability to solve social problems, thereby focusing on the human being, not just on technological development. We are not looking for the cheapest way to generate energy (which is often fossil fuels), but we want to generate energy in harmony with the environment! Teachers and professors can contextualize their classes by considering the UN Sustainable Development Goals so that students can learn how technical content studied in the classroom can be applied to everyday problems so as to eradicate poverty, reduce inequalities, generate clean energy, reduce climate change, preserve life, and promote peace and justice, as well as other goals of the 2030 Agenda. Such an approach will be a source of motivation for many students!

The crucial role of every educator, related to the development of students, can be summarized in the words of ’Abdu'l-Bahá (1844-1921): “Teach them to dedicate their lives to matters of great importance, and inspire them to undertake studies that will benefit mankind”. Such is the role of a true educator: to inspire students to act for the benefit of humanity.

Begin with the Village:

The Baha’i Approach to Rural Development

*The Baha’i World recently published an article that is of extraordinary interest to IEF members, and it is important that this item receive wide readership. Therefore, IEF asked its author, Paul Hanley, to introduce the article:*

Rural development, agriculture, and protection of the natural world are keystones of the Baha’i movement. In Writings such as the *Tablet of the World* and the *Tablet of Carmel*, Baha’u’llah sets out high-level principles to guide the Baha’is—and the world community—in their pursuit of an ever-advancing civilization.

Guided by His father’s teachings, ’Abdu'l-Baha (usually addressed as the Master) was ever at the forefront of progressive ideas and initiatives that addressed the exigencies of His time. The ground-breaking work that ’Abdu'l-Baha undertook in sustainable agriculture and rural development was no exception. For example, in 1901, the Master established the village of ’Adasiyyah in Palestine that, over time, became a renowned model for progressive rural and agricultural development. At ’Adasiyyah, the Master put into practice Baha’u’llah’s principle that, “Special regard must be
paid to agriculture,” which Baha’u’llah called a “vital and important matter.” Under ‘Abdu’l-Baha’s careful guidance we can see, in practice, principles for the simultaneous spiritual, social, and material advancement of a rural community. Significantly, we also see how the Master guided the farmers to an ever more sophisticated and sustainable approach to land management, what would today be called regenerative agriculture or agroecology.

Presently, the Baha’i world is in the early stages of shaping an approach to rural development that aims to build the capacity of individuals, of communities, and of institutions so as to address the complex issues of material and spiritual development. This is exemplified in current efforts to establish local Houses of Worship— institutions that will be central to the process of carrying forward an ever-advancing civilization—in rural areas.

These observations are explored in the article Begin with the Village: The Baha’i Approach to Rural Development published on The Baha’i World website at https://bahaïworld.bahai.org/articles/begin-village.

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Complex Systems Science and Global Challenges

On 7-9 December 2019, the Center for Emergent Diplomacy, based in Santa Fe, New Mexico, an organization specializing in complex adaptive systems, convened a Complex Systems Science Gathering in Stockholm, Sweden (https://tgim.se/event/css2019/). The gathering brought together nine leading international specialists in complexity science with local experts and practitioners to launch an exploration of the catastrophic risks of collapse in the present global society faced by the climate and biodiversity crises and a materialistic economy out of control. The aim was to try to find ways forward towards the adjacent possible that might provide hope for the future.

The gathering was facilitated by Dr. Merle Lefkoff, Executive Director of the Center for Emergent Diplomacy and mediator in conflict zones around the world, and featured Dr. Stuart Kauffman, an award-winning theoretical biologist and complex systems researcher studying the origin of life on Earth; along with IEF President Dr. Arthur Dahl, a biologist at the science-policy interface in intergovernmental organizations working on proposals to reform global governance; Stephen Guerin, President of Redfish Group in Santa Fe, applying the science of complex adaptive systems to create living software systems; Katherine Peil Kauffman, Founding Director of EFS International fostering global emotional wisdom; Dr. Gary Metcalf, an American systems scientist, organizational theorist, management consultant and university professor; Dr. Luciano Pietronero, Professor of Physics at the University of Rome “Sapienza” and Director of the Institute of Complex Systems of the Italian National Research Council; Dr. Michael Rostek, a futures researcher advising the Canadian Armed Forces; Dr. Naresh Singh, an international development advisor applying complexity science to sustainable livelihoods, poverty and environment; and Steven Smith, President of Los Alamos Visualizations Associates working on computer-mediated perception and modelling. A number of Swedish experts joined the discussion.

Complex Systems Science Gathering
The first day was devoted to small group discussions of the key challenges and the perspectives that systems science could provide concerning their causes and consequences. It intentionally had no preset agenda and no specifying goals or objectives to encourage holistic analysis. The process aimed to combine the experimental evidence of reductionist science with the deep experience of indigenous peoples. As a starting point, it was noted that, while science is warning us that we may not survive, the future is unpredictable. The linear path of strategic thinking is not working, requiring imagination and deep humility.

A number of key questions were raised. How do we deal with an economy that is out of control? What do we need to unlearn? What rules do we need to live in peace with ourselves and the world? Living systems are self-regulating. What would nature do? How do we learn from nature and work for the
recovery of the Earth? What new conception of ethics and morality can be grounded in complexity theory? What new narrative do we need to communicate to bring change? How do we influence people and get them to stop believing that they are powerless? How do we co-create the future? There was an acknowledgement that we needed universal values, which had been left to religion and philosophy, but were missing in the mechanistic story of the materialistic society, while complexity science describes self-organization and self-regulation to achieve balance. Many participants were open to the spiritual dimension as a necessary part of human complexity. The exchanges provided a rich cross-fertilization of perspectives and initiated a process of networking among experts from different and complementary areas of expertise. While it was relatively easy to define the problems, the difficulty was in imagining solutions and envisioning a better future.

A personal contribution

My own contributions to the small group discussions and individual conversations are summarized in the following paragraphs. They addressed the problem of looking at the wrong level, considering the symptoms of our problems rather than the underlying causes of system dysfunction.

The climate crisis is the result of an economy out of control, where only profits count. The economy is working on the wrong assumptions of equilibria and perfect actors requiring endless growth in wealth measured as GDP and return on capital (Beinhocker 2006). The present economy is dominated by the neoliberal distortions of the Washington Consensus and the thinking of the Chicago School for which profit is everything. This assumes that the optimal choices are guided by the invisible hand of self-interest, and the environment and social issues are externalities. The result is the concentration of wealth in multinational corporations buying their way to monopoly dominance for ever-increasing shareholder returns and the rise of the top 1%. Excessive borrowing to maintain “growth” is producing a giant debt bubble.

The political systems have been designed for or co-opted by such power and wealth. As expressions of ego, power corrupts. Any sense of community responsibility or the common good in governance is lost. Special interests lobby and corrupt. The politics of fragmentation, manipulation and false news/alternative truths lead to authoritarianism if not despotism (MacLean 2017). National sovereignty no longer works in a globalized world, but those in power can use it as a shield.

Collapse is part of systems thinking. When a system gets severely out of balance, overshoot and collapse are the normal response. If a system becomes too rigid and inflexible, unable to innovate in changing conditions, collapse is a mechanism to sweep away obstacles to change and to allow evolution to proceed. The collapse of civilizations has been widely discussed (Meadows et al. 1972, 1992, 2004; Homer-Dixon 2006; MacKenzie 2008, 2012; Turchin 2008, 2010, 2016; Ehrlich and Ehrlich 2013; Diamond 2005, 2019), so we should expect and plan for it.

What is the elephant in the room?

The information in complex systems and the rules by which they function are coded differently as the layers of complexity increase, from physical laws and chemical interactions to DNA instructions and ecological interactions. In human systems, the coding can be in cultures, laws and ultimately values that determine how people relate to each other.

In looking at the crises we are facing today from our different perspectives, we are like the story of the blind men and the elephant, with each one of us only experiencing part of the whole elephant. But once we have identified the elephant from our complex systems perspective, what do we do with the elephant in the room?

The present system is based on a conception of human nature as aggressive, competitive, self-interested and materialistic. Adam Smith would be shocked, having written also on moral sentiments. Yet humans have the capacity to be altruistic, ready to sacrifice for the common good, devoted to service to society, moderate, humble, detached from material things (Dahl 2019). Our societies also can show emergent properties of integration and cooperation, just as in highly evolved ecosystems.
(Dahl 1996). That is what is missing in today’s world, both individually and collectively. Our society is morally and ethically bankrupt.

What is the adjacent possible?

The last place that most people in materially advanced countries today would turn for solutions would be religion. To imagine that the return of Christ might be included in the adjacent possible would seem far-fetched. Yet this would not be a bearded white man surrounded by angels with trumpets as He descends in clouds at a UN Summit to bring peace on Earth. The fatherless carpenter from Nazareth did not sit on the throne of David and had a miserable end, leaving a handful of followers, who took centuries to emerge from obscurity. Most other religions started the same way.

Meadows (1992) refers to the need for loving and compassion to overcome pessimism, and Peter Turchin (2016) wrote that religion was the only explanation he could find for civilizations uniting more than single peoples through a disinterested ruling class. The Renaissance was not Christian, but the entry of Islamic values into Europe. Religion is what addresses fundamental values and human purpose, and motivates change. It relates to what is the most fundamental leverage point in a human system (Meadows 1999). Systems thinking could suggest a modern update of beliefs necessary to effect the transformation required. So what might be the design criteria for a modern religion to drive complex systems transformation?

Social principles:
- Fully in harmony with science
- Gender balance
- Unity in diversity across all cultures and peoples
- Justice
- Trustworthiness
- Education, independent investigation of truth
- Able to generate a new economic system, altruistic and cooperative, employment for all, eliminating poverty
- Technology and science for the common good, in moderation, balancing material and spiritual

Spiritual/mystical level:
- love for an unknowable absolute perfection, beyond infinity; humility to acknowledge that we can never define it (God, Allah, Jehovah, etc.)
- exercises to help overcome the ego: prayer, meditation, fasting, etc.
- recognizing that all religions have the same source and purpose

Institutional level:
- no clergy, priesthood, ruling class
- no individuals with power or authority
- collective, democratically-elected, consultative leadership
- federated world government able to manage global problems
- collective security, abolition of war, disarmament
- sustainability, respect and care for environment
- mechanisms for learning, change, adaptation to evolving society

Such a religion could guide an ever-advancing civilization with a focus on growth in knowledge, science, culture, art, beauty, and harmony with nature.

The above is a description of the Bahá’í Faith, an embryonic alternative already existing, developing organically around the world, ready to emerge, perhaps when catastrophe strikes and people start desperately searching for better solutions to their problems. Just as in the age of dinosaurs, the dysfunctional economic and political institutions of today could suddenly go extinct, leaving a formerly insignificant movement, like the mammals, to take over the earth.

One other thing that is clearly needed today is institutions of global governance capable of managing those aspects of our globalized world that are beyond all national control, such as peace and security, and the climate and biodiversity crises and other features of the global environment. With two
colleagues, I have been working on proposals for a profound reform of the United Nations system to make it fit for the challenges of the 21st century, to be published shortly (Lopez-Claros, Dahl and Groff, 2020).

Stockholm Transition Colloquium

The second day was a public event, the Stockholm Transition Colloquium, with a series of presentations that were live-streamed and are now available on Facebook*. The first speaker was Lars Larsson, a Swedish engineer deeply knowledgeable about climate change, energy and sustainability, who has lived and worked with indigenous peoples in Africa and South America and is concerned about local communities and sustainable lifestyles. He described our long stable history of GDP and now exponential growth, and asked how do we bend the curve? Just as we are experiencing negative compound effects, we need solutions with positive compound effects. We must communicate the issues to the public: to leaders with the knowledge to take decisions, to the general public to understand the need to change lifestyles, and in the following years explaining to those who have been forgotten or are fearful.

He was followed by Stuart Kauffman speaking on the unpredictable future and the adjacent possible. Complex systems are made up of simple parts interacting in deterministic chaos. The biosphere is not algorithmic; there are no laws for biosphere development. He went from atheistic to agnostic seeing nature as sacred. Functionally-relevant processes are not predicted by physics. We cannot predict where pre-adaptations will lead, just as we cannot predict the adjacent possible. Reason is an insufficient guide for living forward, so we need innovation. We make new things to solve problems by endlessly combining what we have, producing the hockey stick graphs of hyperbolic growth to infinity. Our juggernaut of a global economy has lifted millions out of poverty while driving the climate crisis and a mass extinction. More than half the biomass on the planet is now people and domestic animals, creating the Anthropocene with its existential threats. Seven billion people could not return to survival level in a crisis, yet there are solutions. Small farms are more productive than the industrial monocultures driving extinction. What will be necessary to allow the emergence of adjacent possible solutions?

Merle Lefcoff, the conference organizer, described complexity science in the Anthropocene and her 35-years experience using it to mediate in conflict situations, such as the Camp David agreement between Egypt and Israel. Epic wins require persistence and the science of surprise, in black swan events when victory is snatched from the jaws of defeat. This is now needed for climate change. We cannot predict unintended consequences. What event might save the planet? She reminded us of the conclusion of the consultations among indigenous peoples at the United Nations that we need values change for survival.

Pella Thiel, Vice-chairman of End Ecocide Sweden and winner of the WWF Environmental Hero of the Year 2019, called for a sense of direction when faced with the unknown and unknowable. She referred to the student strikes of Fridays for the Future, and Greta Thunberg wanting us to panic. Our children are living with complexity and need stories of another vision and culture. To indigenous people, the world is alive, complex and sacred, as science is also demonstrating. We cannot solve our problems in the present system and need transformation. Donella Meadows with her 1972 “Limits to Growth” was ridiculed. Her 1999 “Leverage Points for Systems Change” called for a values shift and paradigm change for our survival. We must create another story, shifting our world view to be part of the living world and condemning ecocide. She called for an event in 2022, the 50th anniversary of the Stockholm Conference, leading to a Universal Declaration of the Rights of Nature by 2030.

Professor Karl-Henrik Robert, renown cancer specialist, founder of The Natural Step, winner of the Blue Planet Prize and the Green Cross award and leading expert on sustainability, gave a masterful presentation on strategic sustainable development. Rather than worrying about the immediate symptoms and ignoring the long term, we need to go to root causes and identify the boundary conditions for success.

Boundary conditions are not negotiable. In cancer, this means killing the cancer cells without killing the
Our decision-makers and national economies are like cancer cells. We need to find our way from unsustainability to sustainability to restoration of the planet's capacities. Our environmental problems (forests, crops, water, chemicals, heavy metals, climate, biodiversity) and social problems (trust, segregation, corruption) are symptoms. We need vision to look for the basic mechanisms behind the impacts, and understand how the evolution of systems leads to a huge growth in value, as a model for a sustainable economy decoupled from growth, with principles for ecological sustainability rather than an increasing concentration of extractive solutions. Spatial planning is key, since biodiversity, food, resource extraction, energy and infrastructure are all surface demanding. For social sustainability, trust is important, with a vision and core values. Without trust, we go to corruption, disorder and no cooperation. We are going backwards in evolution now, and the most complex species are the most vulnerable.

Stephen Guerin showed computer simulations of collective behaviors. He referred again to Donella Meadows and the importance of leverage points in systems. In living systems, energy flows and matter cycles. The science of complexity is about interactions. Models of complexity can show systems behaviours. With atoms, there is no pattern, only density. Fish and birds show flocking and schooling with no leader. Traffic shows backward wave behaviour. In complex systems like economics, there are large gradients and stocks with no equilibrium. With systems like eddies in water or ants finding food, the collective organization persists despite disturbances, since cognition is in the system, not the water molecules or individual ants. Life is an ecological property of the system. He demonstrated his computer-modulated light technologies for predicting the path of forest fires, where there are phase transitions with tree density.

Angelica Lips da Cruz, CEO of Innorbis and a consultant on sustainability to the finance industry, described how to combine expertise from natural and social sciences and economic values into solutions for sustainable development. Today's economic system uses metrics only of non-living things. The accounting system is not working for our benefit. We need to change the old system of values to include the environment and people presently considered as externalities. A complex adaptive systems approach can help us to make sense of the economic challenges. There were market bubbles in 1900s, 1929, 1937, the post-war bull market and dotcom bubble, with an everything bubble today. Regulations are too late. Looking at real hourly compensation and productivity, the latter has increased steadily, but there has been no increase in hourly compensation after 1972 with the end of the Bretton Woods agreement. The economy has destroyed nature while leaving the workers behind. Among the sustainable development challenges, governance is the most important, as it is necessary to control the private sector.

On the last day teams of journalists recorded interviews with many of the experts to prepare a lasting record of the accomplishments of the gathering. Even the location of the event was exemplary at a hotel in the outskirts of Stockholm serving only delicious vegan food.

* https://www.facebook.com/ComplexSystemsScience/videos/471848673738529/
https://www.facebook.com/ComplexSystemsScience/videos/54225399955262/

REFERENCES


