Science for the Future: Young Scientists in the Face of Global Challenges

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Young Scientists are in trouble. Or so it seems. Senior as well as younger scientists have decried the difficult situation young scientists are facing as well as the fact that stable job prospects are almost non-existent. Young scientists today confront “a harsher, more competitive, stricter, more dispiriting workplace” than ever before, declares the editorial of a Nature special issue that was dedicated specifically to the plight of young scientists. Everyone in science needs to help ensure “that the next generation of researchers is not lost.”

Such stories paint a dire situation and rectification is surely needed, but focusing too exclusively on these laments does disservice to young scientists. Young scientists also bring hope for a better future. They have the knowledge, skills and expertise to understand an increasingly complex world. They not only seek understanding; more and more they want to take action based on the available knowledge and evidence. Despite the difficult circumstances in which they work, the best early-career scientists and scholars are better equipped than ever to foster more collaborative research and find solutions for the global challenges that we are facing.

Young scientists need the opportunity to grow and need to be supported as leaders, all the while recognizing that they are often already accomplished leaders in their own right. Two global initiatives that make a difference in supporting young scientists as young leaders stand out: the Global Young Academy, which recently celebrated its tenth anniversary, and the Tsukuba Conference, a global meeting that gathers Young Global Leaders in science, technology and innovation.

Giving a Voice to Young Scientists

The Global Young Academy (GYA) is a worldwide academy of 200 members who are carefully selected for their research excellence and their willingness to serve. All of its members are committed to have a positive impact on society. The GYA is multi- and interdisciplinary and its global scope, transcending all national and regional borders, is unique for a science academy. Together, this global, interdisciplinary group harnesses a diversity of perspectives to address global challenges, contributing an inclusive voice to the global policy dialogue. By giving a voice to early- and mid-career scientists and scholars around the world, they aim to achieve a more inclusive science that works towards a sustainable future.

Identifying, developing and nurturing future global science leaders is part of the GYA’s purpose. First of all, the GYA selects and brings together those scholars who have been called “our best bet on the global scientific leadership in the next 5-15 years”.

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This is only the core of a worldwide network of young scientists, however, as GYA members are committed to support young scientists globally. The GYA facilitates young scientists to organize themselves in National Young Academies and supports other young scientist organizations. The Young Academy of Japan is an important partner of the GYA in this respect. Furthermore, the organization gives young scientists the opportunity to work as experts and science advisors for national and international organizations such as the InterAcademy Partnership, the Network of African Science Academies, the European Commission, the GScience, or the United Nations.

The GYA has conducted several pilots studying the situation of young scientists globally and regionally. One of the important outcomes was the recognition that young scientists need support to grow as science leaders. Young scholars are too often entreated to stay in the lab and focus exclusively on their research: they are not expected to speak up, they don’t have opportunities to develop leadership skills and are discouraged to engage in societal issues. Nevertheless, young scientists more than ever want to serve society and live up to a new ideal of a more active engagement. As such, the GYA has developed a science leadership training, the Science Leadership Programme (SLP), which specifically addresses the needs of early-career researchers. After many years of successful SLPs in Africa and the ASEAN countries, the GYA is exploring the science leadership model as a long-term, global project. Priority areas with a strong need for SLPs are Latin American and APEC countries, but the GYA is actively looking for partners to explore a Science Leadership Programme globally, in any country where there is strong interest in developing new science leaders.

The Tsukuba Conference is a new initiative to provide a platform for young global leaders in the field of science, technology and innovation from all over the world. The meeting will be held every other year in Tsukuba Science City, a city in Japan which already houses a few hundred research institutes and more than twenty thousand researchers. The ambition of the conference is to bring together “future shapers” from all over the world with the mission to transcend all borders, be it national, professional, disciplinary or institutional. It provides them with the opportunity to express their vision of the future and to meet their collaborators. As such, the Tsukuba Conference’s purpose is very close to the mission of the GYA and both have fruitfully collaborated towards making the First Tsukuba Conference, held on October 2-4, 2019, a success.

**Young Scientists for the SDGs and Society 5.0**
The First Tsukuba Conference addressed the Sustainable Development Goals (SDGs) and Society 5.0. For the uninitiated, this sounds rather benign: sustainability is a friendly word and 5.0 seems only to be the next upgrade in a longer series. This hides the fact that the conference was about finding responses to the biggest crises humanity has ever faced. The Sustainable Development Goals are
a response to a planetary crisis that is exemplified in climate change but which plays out in so many other areas where human activities have become unsustainable. Society 5.0 is a response, designed in Japan, to find solutions to problems posed by our changing societies, and in particular, by the effects of aging in Japan and other industrialized nations. Combined, these problems pose a momentous challenge, because the energies of the younger generations may be spent on caring for the elderly while what we need is a young, vibrant and dynamic society that is knowledgeable, skilled and prepared to tackle the planetary crisis.

The Sustainable Development Goals are the United Nations’ blueprint to achieve a better and more sustainable world. They address global challenges, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. Building on this, Society 5.0 is Japan’s plan for reaching a “super smart society” using the newest technological innovations to create a new social contract and economic model. The foundation that underpins the reform is a creation of new values by the integration of cyberspace and physical space (CPS). The Japanese government sees this as a new fundamental upgrade, similar to other revolutions such as the Industrial Revolution in the 19th century and the Information Revolution in the 20th century. In order for this to be possible, however, society will have to break down the “walls” or obstacles presented by bureaucracy and administration, the legal system, deficient technologies, and a lack of adequate human resources.

Our future, that is, the future of the planet and of humanity, is at stake. The future traditionally belongs to the younger generations but by now they have made it abundantly clear that they feel that their future has been stolen or even destroyed. At the same time, a lot of hope is placed on these young people in the expectation that they will be able to fix the global problems that we face. Those who downplay the planetary crisis say that future science and technology will solve any issues that may come up. The person who, today, most embodies the first part of this argument is Greta
Thunberg, the Swedish environmental activist who received global coverage with a new movement of climate strikes. She has accused the older generations, and especially global leaders, of denial, looking away and inaction on the climate crisis. At the same time, she has made it clear that putting our hopes in the young, in her generation, is misplaced, because by the time they will be adults, it will be too late to act.

Standing alone in front of powerful audiences, she presents a poignant image of an innocent child that speaks truth to power. This image is very effective and has created a worldwide response, but she knows that on the political level there is still, mostly, inaction. Although politicians now give her a platform, it looks like they still don’t really listen. Asked after a speech at the EU Parliament in Strasbourg whether she has seen any sign of change or progress so far, she bluntly answers: “no”.11 In a recent, very powerful 1-minute speech at the U.S.A. Congress, she has simplified her message. She did not present a long statement but she deposited her testimony: the 2018 “Global Warming of 1.5 °C” IPCC report.12 Her simple message was: “Don’t listen to me, listen to the scientists”. It is in itself already amazing that a teenager would need to give a voice to the most senior scientists. It is even more stunning that the world’s experts would not be listened to. In a surreal moment, the committee chair asked: “Why is it so important to listen to the scientists?” Thunberg’s succinct response was: “This is not political opinion. This is the science!”13

**Giving a voice to science**

Giving a voice to science is critically important today, and we should all be grateful to Greta Thunberg for making this point. It is the mission of the Global Young Academy to give a voice specifically to young scientists, without boundaries or borders. These young scientists are young enough so that the future we are talking about is still their future. They also belong to a generation old enough to have the required knowledge, skills and expertise to make a difference now. As young global science leaders, they are the future. These young scientists have the energy, intelligence and commitment to change the status quo. We need to support and enhance platforms like the GYA and the Tsukuba Conference that empower these new science leaders and give them a voice.

Let us listen to the scientists a bit more closely. A week before the Tsukuba Conference, an Independent Group of Scientists appointed by the Secretary-General of the UN released the Global Sustainable Development Report (GSDR) 2019 The Future is Now – Science for Achieving Sustainable Development.14 This is the first report, and follow-up reports will be produced once every four years to inform the quadrennial SDG review deliberations at the General Assembly of the U.N. The authors were assisted by scores of other experts and reviewers, including GYA members and other young scientists. The report maintains that “the current development model is not sustainable, and the progress made in the last two decades is in danger of being reversed through worsening social
inequalities and potentially irreversible declines in the natural environment.” A more optimistic future is still attainable, “but only by drastically changing development policies, incentives and actions.”

The situation is indeed dire. In the Foreword of the report, UN secretary general António Guterres writes: “Our world as we know it and the future we want are at risk. Despite considerable efforts these past four years, we are not on track to achieve the Sustainable Development Goals by 2030. We must dramatically step up the pace of implementation as we enter a decisive decade for people and the planet.” Liu Zhenmin, UN Under-Secretary-General for Economic and Social Affairs concurs in the Preface to the report: “The Report makes clear that we are at risk of irreversibly degrading the natural systems that sustain us and further points out where we are off track in “leaving no one behind”. More ambitious, more transformative and more integrated responses are urgently needed.”

The GSDR recognizes that younger generations have a crucial role to play in informing, deciding and implementing these responses. Chapter 3 ends with this paragraph: “People everywhere, especially the younger generations, are ready to tackle our shared sustainability challenges. There is, for example, growing support and political traction for climate action, changing consumer behaviours and environmental protection. Young scientists often play a central role in mobilizing those ideas through creative science and independent voices, facilitated by networks such as the Global Young Academy and the Major Group on Children and Youth. By bringing together societal actors and non-academic knowledge providers committed to the 2030 Agenda, science can secure its position as an indispensable provider of valuable, trustworthy evidence and advice.” Young scientists deserve a seat at the table and need to be involved in key decision making by policy makers and politicians that may affect the future of the planet.

A major conclusion of the report is that previously scientists and policy makers did not take enough into account the “interlinkages” between problems. If we work on the SDGs haphazardly, some tipping points and red lines may have been crossed already by the time our actions bear fruit. If we can make use of positive synergies, however, we may see results much sooner and this will be essential in the race against the clock. The GSDR identifies six entry points that offer the most promise. These are not related to any specific Sustainable Development Goals but refer to deeper interlocked and underlying systems.

Focusing collaborative action on these six points can accelerate progress towards the SDGs:

1. Strengthening human well-being and capabilities;
2. Shifting towards sustainable and just economies;
3. Building sustainable food systems and healthy nutrition patterns;
4. Achieving energy decarbonization and universal access to energy;
5. Promoting sustainable urban and peri-urban development;
6. Securing the global environmental commons.

Young scientists are very active in all these areas, and it was exciting to see the dynamic conversations happening at the Tsukuba Conference on exactly these themes. There were panels on urban medicine, megacities, sustainable economies, new approaches to food and agriculture, climate change and much more, and if we can leverage and accelerate such initiatives, these discussions will lead to promising new integrated scientific, technical, social and cultural innovations.

An inclusive science for the future
The GSDR offers a pathway for scientists to work on solutions that may make a substantial contribution towards solving the current crises. There is, however, an elephant in the room. Why indeed does Greta Thunberg insist that politicians need to “listen to the scientists”? There is a lot of fantastic science out there, but if no-one listens, if no-one acts, what is the point? How does one tackle human-induced climate change in situations where half of the population does not believe it exists, or does not care, and who elect governments who deny the science and spread “false truths”?

This is why the Society 5.0 program is so inspiring. A central part of Society 5.0, as we have seen, is to overcome four current obstacles or “walls”. At the basis of these obstacles lies something else, however, a more fundamental “wall” or obstacle to be overcome: the “wall of social acceptance”. The linchpin on which everything turns is the (lack of) social acceptance. If there is no social acceptance of a new technology, how brilliant it may be, it will be of no use. This also holds for science. The social acceptance of science is crucial and is also at the foundation of any solution to our global crises.

The Society 5.0 program is essentially human-centered. With Society 5.0, Japan aims to become the first country in the world to achieve such a fully human-centered society. This should also mean fully integrating the humanities and social sciences in the Sustainable Development Goals. Because in the end, the sustainable development challenges, global as they are, need solutions that can be implemented locally. For such an implementation to be possible and take root, it is necessary to understand a diversity of local values, ethics, identities, histories and cultures. It implies adapting science and technology to local circumstances so that new insights and new social and technical solutions will be socially and culturally acceptable.

To arrive there, we may not only have to upgrade our society to “Society 5.0”; we may also need an upgrade in our science systems. Scientists, like policy-makers, are still too often confined to their “silos”. They are limited by their disciplinary concerns, and it has proven to be especially hard to integrate the perspectives offered by the natural and engineering sciences with the humanities and social sciences. The Global Young
Academy and the Tsukuba Conference are again trailblazers in this respect. These initiatives are not only interdisciplinary, they are open to all disciplines, including all fields from the social sciences and humanities. For the GYA, “science” is understood in its broadest sense and encompasses the arts, humanities, as well as social and natural disciplines and it promotes inclusive science-systems overcoming generational differences, national boundaries and disciplinary divisions.

All are invited to join the discussion about global challenges and are encouraged to find solutions together. We need such a more inclusive science in order to build a science for the future.

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1 This text is a revised version of the opening keynote at the First Tsukuba Conference, a conference for Future Shapers, held in Tsukuba Science City, Japan, October 2-4, 2019.
2 Editorial “Early-career researchers need fewer burdens and more support” and online abstract in Nature 538, 427 (27 October 2016) doi:10.1038/538427a.
3 See https://globalyoungacademy.net/
4 http://www.scj.go.jp/en/yaj/
5 The GYA “Global State of Young Scientists” (GloSYS) report was published in 2014. It is the first study taking into account not only the established science systems in Europe and America, but also comparing the status-quo with new and original findings on developing nations and world regions that have received little previous research attention. (https://globalyoungacademy.net/wp-content/uploads/2015/06/GYA_GloSYS-report_webversion.pdf). The first regional GloSYS report, covering the ASEAN region, was published in 2017. (https://globalyoungacademy.net/wp-content/uploads/2017/01/GloSYS-in-ASEAN_webversion.pdf), Pilot studies for Africa and Latin America and the Caribbean are underway.
6 https://globalyoungacademy.net/activities/strategic-project-science-leadership/
7 https://tsukuba-conference.com
8 Statement by Dr. Kyosuke Nagata, President of the University of Tsukuba as well as the Chair of the Tsukuba Conference Organizing Council, introducing the 36th Award Ceremony of the World Cultural Council at the Tsukuba Conference, October 2-4, 2019 in Tsukuba Science City, Japan. https://tsukuba-conference.com/wcc/
9 https://sustainabledevelopment.un.org/?menu=1300
10 https://www.mext.go.jp/en/policy/science_technology/lawandplan/title01/detail01/1375311.htm; https://www8.cao.go.jp/cstp/english/society5_0/index.html
11 Exchange of views with Greta Thunberg, climate activist - Committee on the Environment, Public Health and Food Safety: Opening statement by Greta THUNBERG, climate activist. https://multimedia.europarl.europa.eu/en/exchange-of-views-with-greta-thunberg-climate-activist-committee-on-the-environment-public-health-and-food-safety-arrivals-and-general-views-pre-exchange-of-views-1406-1412_i171433-V_v. For a transcript, see: https://www.theguardian.com/environment/2019/apr/23/greta-thunberg-full-speech-to-mps-you-did-not-act-in-time
12 In November 2019, the European parliament declared a global “climate and environmental emergency” and urged all EU countries to commit to net zero greenhouse gas emissions by 2050 (https://www.europarl.europa.eu/news/en/press-room/20191121IPR67110/the-european-parliament-declares-climate-emergency) and in December 2019 incoming European Commission President Von der Leyen presented a Green Deal for the EU (https://ec.europa.eu/commission/presscorner/detail/en/ac_19_6778).
13 The report’s full name is “Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.” (https://www.ipcc.ch/sr15/)
14 https://www.theguardian.com/us-news/2019/sep/18/greta-thunberg-testimony-congress-climate-change-action
15 https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf
16 Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development, p. 125