

G Science Academy2023

Addressing systemic risks in a changing climate: Science and technology in support of cross-sectoral decision-making



The Academies of the Group of Seven (G7) countries express their grave concern about three recent major challenges and the rapidly growing compound risks that they pose for human well-being, functioning economies, and healthy ecosystems. The first challenge arises from recent climate disasters, such as floods, droughts, wildfires, and heat waves, which can already be attributed to anthropogenic climate change. These events are expected to occur with ever greater frequency and severity, resulting in unprecedented risks across the world. Second, the COVID-19 pandemic has had a severe socio-economic impact on countries around the globe, as well as a health impact on people everywhere. Finally, the Russian invasion of Ukraine, gravely violating international law, seriously threatens the rules-based international order, and has driven the world into a global food and energy crisis. Due to the cumulative impact of these events, complex, cascading, and systemic risks already present within social, economic, and environmental systems have intensified, threatening human lives and prosperity beyond national boundaries.

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report recently concluded that economic benefits which would arise from limiting global warming to 2°C above pre-industrial levels, would exceed climate mitigation costs. It established that, consistent with the Paris Agreement, the potential impacts and associated risks of global warming would be significantly lower if kept to 1.5°C than 2°C. The IPCC also affirmed the necessity of full commitment to the achievement of global net zero greenhouse gas emissions by or around mid-century. There are clear reasons for this. Very severe climate impacts by the end of the 21st century are now widely perceived as the consequences that children today and the following generations would experience in the future if prompt action is not taken now. Investigations increasingly indicate other possible consequences, such as how climate change mitigation or adaptation, including nature-based solutions, could impact other development goals, and how changes in current behavior and values, including dietary habits, could deeply affect society. Even despite great efforts to reduce greenhouse gas emissions to zero, there are likely to be residual emissions that need to be offset, requiring additional carbon dioxide removal activities. These include capture and geological storage

of carbon dioxide and activities such as planting trees and increasing soil carbon content.

The reduction in greenhouse gas emissions caused by the COVID-19 pandemic was not significant enough for its impact on climate to be detected above natural variability. The pandemic increased society's vulnerability to climate change in various ways. It limited access to medical services, and worsened the damage induced by hydro-meteorological extreme events. The pandemic also slowed the progress of economic development and hindered the advancement of social equity, making society more vulnerable especially in low-income countries.

The invasion of Ukraine has exacerbated existing climate change and health challenges and diverted major resources away from these challenges. It has also reinforced the understanding that an abrupt drop in agricultural production and exports by one major farming country can have a profound impact on global food security. This is especially the case for low-income countries, due primarily to a sharp global increase in prices for agricultural commodities. Likewise, the world faces a major energy crisis that must be overcome in unison through concerted efforts by vigorously promoting the shift away from fossil fuels to alternative and renewable energy sources, and by accelerating emission reductions, including via market-based approaches, in line with the goals of the Paris Agreement.

These three challenges have highlighted the need for action to reach climate targets. At present, a significant gap remains between the greenhouse gas emission reductions necessary to meet the agreed Paris climate goals and the Nationally Determined Contributions (NDCs) for 2030 that countries have offered. There is also a gap between the NDCs and the implementation of national plans to achieve them. This calls for swift and resolute action to manage climate related and other threats to foster the development of sustainable and resilient societies in which no one is left behind. The way forward can be achieved only through discussion and effective problem-solving, employing a cross-sectoral decision-making process based on scientific evidence across national, regional, and cultural boundaries. For example, the workshop co-sponsored by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and IPCC in 2020 high-

lighted the interdependence of limiting global warming and protecting biodiversity for a habitable climate, as well providing sustainable benefits for society¹⁾. The new post-2020 Global Biodiversity Framework, recently adopted at the UN Biodiversity Summit (CBD COP15), aims to balance reducing the impacts of climate change on biodiversity with maximizing the benefits of natural ecosystems for regulating the climate and benefiting society²⁾. Accelerating such momentum requires cross-sectoral consilience, linking cutting-edge science and technology with individual action, and shaping human resources necessary to lead these efforts³⁾.

In order to limit global warming to 1.5 degree, the leaders of the G7 have committed to reduce global

greenhouse gas emissions by 43 per cent by 2030, to accelerate the clean energy transition towards achieving net-zero emissions no later than 2050, and to enhance resilience and adaptive capacity to the impacts of climate change⁴⁾. To accelerate the transition to low carbon technologies in the sectors such as transport and electricity through science and engineering and convert their commitments into achievements, we urge the G7 countries to take the following six actions in order to ensure energy and food security, stabilize the societal and economic recovery from the COVID-19 pandemic, safeguard ecosystem services, and enable their societies to thrive despite systemic risks arising from a changing climate.

Recommendation 1

Increase support for improvement of models to project impact of anthropogenic climate change on economies, which will also create a better understanding of the effect of potential policies on national and global economic development. Integrated quantitative assessments are needed to define the technological, social and economic steps required to achieve commitments to reduced emissions by 2030 and net-zero by 2050. This should involve national road maps to net zero, informed by research and analysis, and should act as exemplars for other nations outside the G7.

Recommendation 2

Accelerate quantitative assessments across disciplines using observation, model development, analysis, and evaluation by integrating the knowledge of climate, water cycle, biological processes, agriculture, energy consumption, and anthropogenic and natural greenhouse gas emissions in the natural and social sciences and humanities.

Recommendation 3

Establish cross-sectoral frameworks at local, national, regional, and global levels to link cutting-edge science with on-site decision-making and action. International cooperation in IT infrastructures, such as exascale computing for the next generation models of climate and its impacts, and data integration functions, should be developed to support these frameworks and address challenges in climate change mitigation and adaptation and disaster risk reduction.

Recommendation 4

Support the integration of data assessed in various reports by promoting globally coordinated activities to increase data accessibility in cooperation with the Group on Earth Observations (GEO) and other relevant organizations. Relevant key reports include, for example, national reports on global indicators of the SDGs and the Sendai Framework for Disaster Risk Reduction, IPCC and IPBES assessment reports and their data repositories, NDC performance reports, the Glasgow Leaders' Declaration on Forest and Land Use at UNFCCC COP26, and the Global Biodiversity Framework at UN CBD COP15.

Recommendation 5

Foster the integration of "facilitators" to work as catalysts capable of providing expert advice based on a broad range of scientific and indigenous knowledge about climate change in the local context⁵⁾. These facilitators can be members of the science community, the education community, the private sector, or local government, with experience and skills in communication. Facilitators can bridge the gaps between scientific society and local stakeholders, support education and training, and inform ways leading to practical solutions.

Recommendation 6

Enhance international technical cooperation and financial support, including repurposing funds and financial frameworks, especially for the most vulnerable countries with a large resource deficit, in order to pursue shared objectives and take concerted actions. This includes a more significant role for the public and private sectors and more effective use of insurance schemes.

References:

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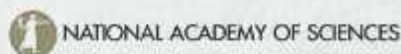
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