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GUEST EDITORIAL

Future Earth: science for the people

The Earth's climate is changing and the global temperature has been rising since the middle of the last century. The anthropogenic emission of greenhouse gases is widely accepted as the major contributor to this warming. The prediction of future trends by climate models indicates that human beings will face serious challenges by the end of this century. Some of these are sea-level rise, coastal inundation, melting of polar ice caps and mountain glaciers, reduction in agricultural productivity and spread of vector-borne diseases. Based on the scientific findings, there is an increasing demand for actions to urgently control the emissions that are perturbing our climate. Climate change is, thus, one of the major challenges of this century and India will be among the worst affected.

While the need for economic growth calls for increased industrial production and energy use, the increase in population and its increasing demands puts pressure on land-use patterns, energy consumption, ecosystem and forests. The pressure is more on the developing and under-developed countries, where poor living conditions of majority of the population demand rapid economic growth. All these call for a careful balancing of development and control measures to ensure sustainable future for the Earth. This can be achieved only through constant interactions and involvement of scientists doing basic and applied research with social scientists and policy makers.

'Future Earth' is a major international research platform that was launched in 2015. This initiative hopes to create a global network of scientists and policy makers for providing the knowledge and support to accelerate transformations towards a sustainable world. The primary vision of Future Earth is 'science for the people'. Central to this is a commitment to co-design and co-produce knowledge, with various partners, in order to develop solutions-oriented research that responds to the challenges faced by the society. This calls for inclusive development through partnership with society and stakeholders and thus provides a global research platform linking various scientific disciplines, knowledge systems and societal partners. This demands close interactions between scientific disciplines dealing with climate change, environment, meteorology, ecosystem, agri-

culture, social science, adaptation and policy makers. 'Future Earth' is sponsored by the Science and Technology Alliance for Global Sustainability comprising the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of funding agencies, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the United Nations University (UNU) and the World Meteorological Organization.

Future Earth is a network of networks, and follows a distributed headquarters concept and comprises five global hubs. This is supported by regional centres and offices. Recognizing India's excellent research initiatives and the potential impact of climate change on India, the South Asia Regional Office of Future Earth was established in India at the Divecha Centre for Climate Change (DCCC), Indian Institute of Science, Bengaluru on 9 July 2016, with an objective of linking climate science to policy. The regional office for South Asia has its domain spanning over the SAARC countries, Myanmar and Indian Ocean Island countries. This is an autonomous research platform to promote scientific cooperation between India and the neighbouring countries. One of its chief objectives is to determine a sustainable pathway for the development of South Asia, by integrating the available scientific information from national laboratories and academic institutions and develop strategic knowledge, region-specific solutions and knowledge action plans.

For India, climate change is not merely a scientific issue; it involves a number of issues, including international policy, health, food, water and energy security, insurance, economics and law. Establishment of the Future Earth regional office in India will enable the country to take a leadership role to tackle rapid global change and formulate strategies for sustainable development. India has a strong observational (ground- and space-based networks) capability, modelling expertise and proven leadership record in the above scientific disciplines. The regional office would (a) promote the implementation of specific activities of Future Earth over this region; (b) ensure that regional priorities are made part of the strategic development of Future Earth; (c) operate as

a primary point of contact between interested researchers, research institutions, funders and other interested parties, and Future Earth, and (d) provide up-to-date and timely information about the objectives and organization of Future Earth, actively reaching out to researchers and stakeholders over this region.

Why do we need Future Earth? The nexus of food, energy, water security and environmental sustainability calls for joint global responsibility and cooperation among scientists and policy makers to mediate trade-offs and explore synergies. The demand for water, energy and food is increasing in India due to rising population, rapid urbanization, change in land-use pattern and growth. It is important to note that a fraction of the freshwater resources is being utilized for agriculture and food production also demands energy. Addressing only a few parts of this interlinked problem in isolation may lead to undesirable and unsustainable outcomes. So, inclusive efforts are needed by promoting the technological, economic, social and behavioural changes enabling transformations, while building knowledge about the impacts of climate change and adaptation responses for people and ecosystems. It is necessary to safeguard the terrestrial, freshwater and marine natural assets by developing effective assessment and governance approaches. This requires adaptive governance systems.

With this objective, the Future Earth regional office would develop the knowledge required to face challenges posed by global environmental change and identify and implement potential solutions. The office will interact with laboratories and institutions under various ministries and departments in the process of integrating information to support developing national and international policies related to climate change and related sciences. In view of the region-specific nature of climate change and its impact on the people, it is important to develop region-specific strategies. The regional office would identify, from time to time, the outstanding grand challenges in this direction and share the information with various departments/ministries involved. The other objectives are (a) to inspire and support a new generation of scholars and practitioners doing integrated science for global sustainability to carry forward the vision and mission of Future Earth; (b) build a diverse and connected community of participants and organizations, including scientists, policy makers, civil society and private sector from the region, and (c) mobilize capacities in all parts of the region to cooperate on research that promotes alternatives for sustainable development trajectories for the region.

Since its inception, the regional office has been involved in providing advanced training to students and young researchers to build their capacities for successful science–policy interactions. An international conclave of

young scientists was conducted during December 2016 organized jointly with The World Academy of Sciences Regional Office for Central and South Asia (TWAS-ROCASA). It was attended by 80 young scientists from Central and South Asia. This conference provided a platform for Young Scientists from South and Central Asia to promote networking and offered a unique opportunity for collaborative research by sharing their recent research findings, future plans and research interests. The regional office is also involved in various outreach activities and organizes popular lectures. It has added two major initiatives during the last year. The first one is Monsoon Asia Integrated Research for Sustainability (MAIRS), which is a core project of Future Earth, envisaging to significantly advance the understanding of interactions between the human and natural components of the overall environment in the Asian monsoon region. The scientific steering committee of MAIRS, during its recent meeting held at the Research Institute for Humanity and Nature, Kyoto, Japan, has approved the establishment of a MAIRS Regional Project Office as a component of the South Asia regional office of Future Earth. The second major initiative is the ‘Sustainable Water Future Programme’, which would address the water-related science, policy and societal questions regarding global environmental change. The regional office is expected to become part of ‘Water Solutions Laboratory’ network. This Lab aims to influence policy making at a regional scale by initiating active dialogue among scientists, policy makers and the general public.

In India, an effective science–policy interface for climate change and related environmental issues is not in place. Policy making should depend on information derived from observation-based assessments. The current scientific understanding of the potential connections between climate change and society is not adequate to directly translate them into policy decisions. It is important to pursue this, because India has made substantial commitments to reduce emissions in the Paris Agreement. The challenges before India to accomplish this by 2022, without affecting economy, are enormous. A fundamentally new approach is needed involving scientists and policy makers.

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