G-SCIENCE ACADEMIES SATEMENTS 2013

Driving Sustainable Development: *the role of Science, Technology and Innovation*

1. Introduction

The framework of Millennium Development Goals has led to several in-depth discussions and debates focused on review of the progress made so far and preparation of strategies for post-2015 era to ensure sustainable development all over the world. At the Rio+20 United Nations Conference on Sustainable Development (June 2012), the world's governments agreed to develop a set of sustainable development goals (SDGs). Discussions at UN level have covered Science, Technology and Innovation and Intellectual Property Rights[1]. The Expert Group meeting at UN Headquarter[2]. The Global Network of Academies (IAP) had issued a statement on Population and Consumption in June 2012. Several Academies and other learned bodies have brought out reports on development issues including US National Academies of Science[3]. Other relevant reports are also available[4].

Academies of Sciences around the world provide evidence and advice to inform their countries' development decisions. For the past eight years, a group of academies have addressed brief statements to governments meeting at summits on global issues. These have included several of the issues related to sustainable development, such as energy, climate change, water, health and infectious disease, and resilience to disasters. This year, the Indian National Science Academy has convened a continuation of this process. During these eight years, there has been immense progress in science and technology, including in information and communications technology and natural resource extraction. However, major global challenges remain, and in important ways have grown, especially as related to continued population growth, climate change, and impact on essential natural systems. So meeting human needs, now and in the future, remains a major challenge. Work is underway in the world community to set Sustainable Development Goals for the coming years. We

offer the following perspectives on how science, technology and innovation can play a role in driving sustainable development.

1. A still growing population

Demographic changes are taking place at a rapid pace all over the world. While a semi-stationary population level might be reached by end of the century, the world population is projected to grow to about 9 billion by 2050, from the present level of about 7 billion. Strategies to slow the population growth rate, such as education, empowerment of women and access to family planning, have yielded positive results in the past, and give hope that, if coherently pursued, it might further reduce the projected rate of growth of growth during the coming decades. The challenge to meet the needs of about 1.6 billion additional people, of which approximately 1 billion will be in Africa, in the next four decades, is enormous. At present, however, there is an urgent priority: bringing the estimated 1.3 billion persons living under extreme poverty condition, out of poverty. The enormity of unsatisfied human needs threatens social cohesion as well as the survival of important living systems of the planet.

2.1. Challenges of demographic changes

The demographic structure of many of the less developed areas of the world is still very young, and requires intense investment in order to eliminate illiteracy and improve education at all levels and provide for job opportunities. On the other hand, progress made in healthcare, improved nutrition and healthier lifestyles has led in many other countries to increased survival and increased aging of the population. The wellbeing and social contributions of a growing number of elderly people requires special attention and innovations will be required if we are to provide advanced healthcare and allow valuable societal roles for all.

2.2 Challenges of Urbanization

Some cities around the world are demonstrating potential for efficiently meeting human needs. However, unplanned rates of urbanization in developing economies are putting enormous strains on adequate housing and the management of the resources like water

and energy and the provision of essential services like sanitation, transport, health care and waste disposal. Also, efforts are needed to ensure and protect essential ecosystems in the process of urbanization. It has assumed urgency as by 2050 there will be ~70% urban dwellers globally against ~50% at the present time. Investments in research and innovative new approaches, as well as behavioural changes, are required if we are to make efficient management of scarce resources, and improvements in other areas such as sanitation.

3. Providing for nine billion

Water availability is central to agriculture, industrial and energy production and essential for direct human consumption and for critical ecosystems. In view of the current and projected water scarcity and water stress, new ways of increasing the availability of clean water are essential. Therefore, the improvement of water treatment and management systems and technological solutions in recycling and sea water desalination together with other non-technological solutions should be explored. These approaches require the attention and action of governments around the world.

Nutritious food is one of the most basic needs of human society. The level of food production and elimination of malnutrition and hunger has to keep pace with the increasing population, continuing land use change, and the future effects of climate change. This may require more land for food production and certainly improved management of water resources. Newer genetic resources need to be developed, together with other non technological strategies, to meet the challenges of changing climate on crop cycles and yields. Strategies are required to balance the use of synthetic fertilizers and pesticides with more natural equivalents to ensure environment-friendly outcomes. Simultaneous attention is to be paid to the preservation of biodiversity and functioning of ecosystems. Increased food security in part depends on stabilization of international market food prices. Food consumption and production patterns need fresh science, technology and innovation perspectives to promote health, to cut down postharvest losses and reduce waste.

4. Providing energy without unacceptable environmental impact

Essential aspects of human welfare require energy services. At the same time, fossil fuel combustion has to be implemented within environment and health constraints, and is the predominant driver of climate change, and thus associated impacts including sea level rise, extreme weather events, and ocean acidification. Many studies have identified energy conservation and energy efficiency as essential, multi-benefit, low-cost measures. In addition, a range of clean, renewable energy options are needed to meet the varied needs and circumstances around the world. Systems approaches, including storage, smart grids, conversion of waste and biomass into energy, and in some cases carbon sequestration, will also be necessary--and all require further progress in science, engineering and innovation.

5. Sustainable Consumption

The aspiration for a better quality of life is universal. Yet the resource implications of providing an improved quality of life for all, could jeopardize the future of the coming generations. Levels of material consumption differ enormously between regions of the world and if we hope to raise the aforementioned 1.3 billion persons out of poverty, the most developed and the emerging economies must stabilise and then reduce material consumption levels through: dramatic improvements in resource use efficiency, including reducing waste and employing improved recycling; and investment in sustainable resources, technologies and infrastructures. Systematic decoupling of economic activity from environment is essential. Responsible and inclusive consumption and production are the key elements of sustainability.

6. Towards universal literacy – including scientific literacy

Universal literacy, especially including women, is well understood to be essential for sustainable and equitable development. But literacy must be better understood to include scientific literacy, since many of the challenges we face will require science and technology solutions. For example, the burden of non-communicable, behavior-related (diet, lack of exercise, substance abuse, etc) disease is rapidly increasing, and evidence-based education is a central tool for addressing such issues. Creative and innovative programs are underway in many countries to further improve learning approaches and to equip teachers with the training and resources necessary. Inquiry based science education is a promising approach on which academies around the world are working in support of improving education

systems, and in many cases with support from the private sector. South-South and North-South cooperation in sharing and implementing effective educational approaches are important to deal with the urgent educational needs of the least developed countries.

7. Role of Science Academies

Progress in science, technology and innovation is necessary, although not sufficient to solve the many underlying challenges for sustainable development. These include poor governance at all levels from local to global, inadequate education systems, and lack of rural development (access to roads, financing, education, and empowerment of women). Progress also needs trade reform and a transition of the economic system to one from GDP to GDP+, where economic growth is measured in terms of built, natural, human, social and financial capital. Without good governance and a more sustainable economic system the potential gains from advances in science and technology cannot be realized. The Academies believe that their own promotion of the values of science, including emphasis on evidence, openness, ethical standards, and social responsibility can contribute to good governance. They acknowledge the context within which science and technology exist and pledge to support policy making for sustainable development by:

i. Providing a source of independent, objective expertise, bringing scientific rigour to gathering evidence, including what is known and not known, which ultimately underpins progress towards sustainable development;
ii. Collaborating across academies to raise visibility and capacity to proactively engage with the sustainable development policy community at national, regional and international levels;
iii. Supporting processes to define, measure and monitor at national, regional and international levels, progress towards sustainable goals;
iv. Taking actions to help predict and inform policies to prevent adverse effects of development practices and processes;
v. Training and supporting the development of human resources in science, technology and innovation – starting at primary and secondary level education, including investments in higher education to help build scientific and absorptive capacity to respond to local challenges;
vi. Promoting multidisciplinary research for a holistic approach to sustainable development, including engagement with the private sector;
vii. Improving public awareness of the role of science, technology and innovation can play in promoting sustainable development; and
viii. Promoting south-south and north-south mobility of researchers.

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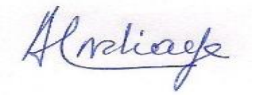
1. Meeting of UN System Task Team on the Post-2015 UN Development Agenda, May 2012
2. ICSU-UN Expert Group meeting to debate framework for sustainable development goals and generate scientific input to the UN, March 2013
3. A Sustainability Challenge: Food Security for All: Report of Two Workshops, 2012; Using Science as Evidence in Public Policy, Kenneth Prewitt, Thomas A. Schwandt, and Miron L. .Straf, Editors, 2012.
4. e.g. the briefing for the UN High Level Panel by UK Collaboration on Development Science, The role of science and evidence in designing post 2015 development goals.

Endorsements



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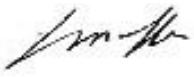

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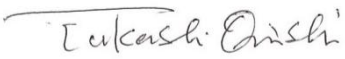

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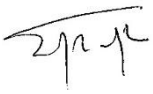

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