UN Secretary - General's Scientific Advisory Board

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Results of a Delphi Study on the Top Challenges
for the Future of Humanity and the Planet
to be brought to the attention of the Secretary-General

SAB/4/INF/7

Background

In December 2014, Secretary-General Ban Ki-moon invited his Scientific Advisory Board (SAB) to identify for his consideration "*scientific concerns about the future of people and the planet.*" Deemed "a great opportunity to leverage the wisdom and the vast and varied experience of all members," the Board responded by conducting a Delphi study to identify the top challenges for the future of humanity and the planet, identifying "big ideas" to be brought to the attention of the Secretary-General and for him to seek a global response. The vision was to generate a set of five to ten big ideas with potentially big impact for global sustainability and facilitate a dialogue around them.

Delphi Method

The Delphi method is used to distill knowledge and build reliable consensus among experts who may not be in the same geographical location. It involves structured, sequential questioning of a panel of experts, in this case members of the SAB, with controlled feedback.[1] A subgroup of the SAB members volunteered to oversee the running of the Delphi study,[2] which took about 3 months to complete.

In round one of the Delphi study, carried out in early 2015, each of the 26 members of the SAB was requested to suggest one "big idea that would have a global impact in addressing the implementation of the Sustainable Development Goals (SDGs) over the next 15 years." Twenty-three such Big Ideas were submitted.

In round two, Board members systematically assessed the 23 Big Ideas giving them a score from 1 to 5 and 11 ideas advanced to round three. Those 11 ideas were reviewed, further refined, and amalgamated with similar ideas, at the 3rd meeting of the SAB in Kuala Lumpur in May 2015. The result was the list of top eight challenges presented in this brief for consideration by the UN Secretary-General.

Top Eight Challenges

One Ocean, Many Countries: Building a "Blue Economy" Sustainably

We have One Ocean and it is an incredibly valuable resource, producing half of our oxygen, eighty percent of our fresh water, and a significant portion of the world's food. It helps regulate our weather and climate, is a source for medicines, materials, and tourism, and provides a primary transportation route for much of the global economy, contributing perhaps $20 trillion annually to the global economy. But largely due to human activity it is becoming warmer, more acidic, and deoxygenated.

As some look to the ocean for an expanded economy, often called the "blue economy", which includes ocean technology, biotechnology/bio-prospecting, fisheries and aquaculture, ocean energy and resources, and data information systems, how do we proceed while sustaining (and restoring) a healthy ocean that is our last frontier? ***The global challenge is how to develop***

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[1] **Daar AS et al.** Grand Challenges in Chronic Non-Communicable Diseases. *Nature*. November 2007. Vol 450, pp. 494-496..

[2] Abdallah Daar (Chair), Maria Ivanova, Reiko Kuroda, Eugenia Kalnay, Hayat Sindi, Wole Soboyejo, and Dong-Pil Min.

new governance mechanisms based on new scientific observations and understanding so that we use our last frontier sustainably.

Addressing Threats to Biodiversity and Establishing a New Paradigm for the Global Tropics

We need to use all our knowledge, skills and resources to reverse the loss of our planet's biodiversity. In magnitude, this issue is in the same league as climate change, and may be more critical and urgent to the global community. Biodiversity is our web of life. It is the fabric of the ecological support system that underpins all of human economies, livelihoods and societies. Unchecked climate change will become an additional global risk to land-based and ocean-based biodiversity.

Current systems of biodiversity and ecosystem governance are often unresponsive to local needs. Centralized governance systems are in a poor situation to understand the local drivers and dynamics of environmental degradation. There is an urgent need for community-based monitoring mechanisms which have been shown to be crucial to conservation and sustainable management of biodiversity.

In particular, in the global tropics, a new development paradigm is required, based on the sustainable use of natural renewable resources, especially those arising from biodiversity and renewable energy, while safeguarding and promoting conservation. This new economic model must rest fully on new science, technology and innovation, underpinned by a new model of appropriate technology co-development by tropical countries and advanced technology centers elsewhere, fully integrating the knowledge of indigenous and local communities. ***The global challenge is how to implement fundamental revisions of models of governance, monitoring and economic development for the benefit of people and the planet.***

Putting in place a Comprehensive Strategy against Infectious Agents, including a Global System for Immediate Response

Ebola has highlighted the inadequacies of the global response system against infectious agents. To avoid another such crisis the global community needs to develop a well-funded and well-structured immediate response system. This needs to be done with the World Health Organization and must include an immediate action group capable of working in different countries worldwide and mobilize-able in a few days. It must include also the rapid mobilization of isolation wards in hospitals as well as mobile laboratories.

At the same time we are witnessing the rapid loss of sensitivity of micro-organisms (bacteria, viruses, fungi, protozoa and helminthes) to our current anti-infective drugs. We need innovative strategies (genomics, antibodies, etc.) to develop new tools to fight antimicrobial resistance. The World Health Organization (WHO) presented its "Global Action Plan on Antibiotic Resistance" at the 68th WHO Assembly in May, 2015. The global community, led by the UN Secretary General, must respond quickly to these two interlinked needs. ***The global challenge is how to design and implement an effective Global Strategy and Response System to fight infectious diseases, and at the same time seriously address the issue of antibiotic resistance.***

Ensuring investment, as a fraction of GDP[3], in Basic Research and Basic Science Education

We believe that basic research and basic science education is the foundation of human knowledge, progress and sustainable development. Basic research is the most prolific source

[3] Gross Domestic Product.

of new ideas. It originates breakthroughs that have transformational impacts on our future and survival. Nurturing scientific ways of thinking and dissemination of basic knowledge among young people, but also among policymakers and citizens, are of utmost importance to achieve the sustainable development goals.

The private sector is not likely to invest as heavily in basic scientific research as is socially desirable, as it mainly targets applied research producing tangible benefits in the short term. Commitments to basic research and basic sciences education should therefore come from governments, public research institutions and higher education institutions. In parallel, the UN should help fight brain drain from developing to developed countries, by strengthening existing institutions, and establishing new regional scientific centers of excellence that will help to retain scientists in their own countries and regions, and attract back their diaspora scientists. These centers need to be accompanied by an enabling advanced modern school system which will provide the next generation of students and researchers from the region. ***The global challenge is to ensure a minimum of 0.2-1% of national GDP is invested in basic scientific research and basic science education, and thereby halt scientific brain drain from low- and middle-income countries to high-income countries.***

Averting Enormous Human Disasters through Prediction

Partly as a result of climate change we face extreme and disastrous weather events that threaten all planetary life, bringing with them large socioeconomic losses: hydro-meteorological disasters account for 74% of total reported losses of US $2.6 trillion.

There is therefore a need to create a global network for Disastrous Extreme Event Prediction (DEEP), under the leadership of the UN. This can be achieved by strengthening and expanding the existing global prediction programmes, managing international observation data, coordinating present and future research activities, constructing mechanism to disseminate scientific knowledge, and providing regional populations with appropriate knowledge and technologies to reduce their vulnerability. ***The grand challenge is to enhance global collaboration on extreme event prediction to avert large scale environmental disasters.***

Emissions Free Technology: Changing the Fossil Fuel Paradigm

We need to increase receptivity for new inventions that might result in groundbreaking discoveries in clean energy generation and use. The strategy will be to develop a framework that will allow even the “craziest” ideas to be properly evaluated, resourced and tested. The UN could play a leading role in achieving this objective by mobilizing scholarly investigations of unconventional energy devices (UEDs). ***The global challenge is to promote the generation of radical new ideas for changing the fossil fuel paradigm***.

Providing Drinking Water for All

“Water is Life.” We have the knowledge and the resources to ensure every human being has access to clean, drinkable water. Yet this is not the case today, and climate change may worsen the current situation. ***The global community, including the UN, must now seriously come together to ensure that this problem for humanity is resolved very soon and resolved sustainably. That is the grand challenge.***

Finding Solutions for a World Overwhelmed by Unequal Resource-use and Continued Population Growth

The Earth System’s capacities to provide essential ecological services that sustain planetary life are being overwhelmed by the explosive increase in the highly unequal use of resources and by continued population growth. The effects can be seen across all environmental and

sustainability issues. ***The grand challenge is for all stakeholders, including government, natural and social scientists, the UN system and civil society to urgently focus on how to find solutions to the root causes of these global problems.***

Conclusion and next steps

Seeking the individual ideas of the members of UN Secretary-General's Scientific Advisory Board was valuable for surfacing and prioritizing potential actionable ideas for the implementation of the Sustainable Development Goals. The process allowed for consensus building among members of the SAB. Subsequent steps in this process could include articulation of possible ways of implementation, the organization of a conference about the challenges as identified by the SAB, and the development of policy briefs or an edited volume including chapters on the ideas proposed by the SAB. The UN Secretary-General may wish to consider making this kind of exercise an ongoing feature of the work of the SAB.