Green growth with blue

This paper advocates that water (hereby occasionally euphemized as blue) is "fundamental element in green growth" that works either positively or negatively. It suggests a few key recommended actions to accelerate green growth by optimizing use of water while minimizing negative impact by water events such as flooding, drought or water pollution.

1. Green growth with blue

Green growth* is not possible without properly addressing blue, i.e. water. 100% of agricultural production and 95% of energy generation (thermal, hydro, tidal and nuclear power as well as even solar of which production requires massive pure water) involves water at processing, production and/or disposal. Climate change is felt through water.in severest form, e.g. sea level rise and flooding. Green growth loses the cleanliness if water involved is not properly dealt with. Green economy without addressing blue will result in social conflict, environmental degradation, and economic loss.

Wisely harnessing and exploiting water, on the other hand, promotes green growth and brings huge benefit to society by, e.g., generating income and enhancing health and well-being for the people. Investing a dollar for blue in a sector, say health, generates returns of 10 dollars or more (by reducing water-borne deceases, etc.).

As water is finite resource, cycling through environment (air, ground and sea), water use, disposal and management should be coordinated by all the related sectors. Good governance is a must for a community and a country to manage such complicated but useful element of social and economic development, by turning individual will and capability into collective action.

Water in green growth should be addressed in the key facets as follows:

- Defining role of water in nexus of the other green growth sectors such as food and energy
- Assessing and proposing concrete ways to mitigate negative water impact on green growth
- Creating new paradigm of green economy using water as catalyst for change

2. Green security by sharing vision, action, and benefit

Water is a key which makes a bridge between the socio benefit areas including agriculture and forestry, health, energy and human settlement and the geophysical and bio-geochemical water cycle processes in atmosphere, oceans and land. Those who lack water security (including security from water-related disasters) are overwhelmingly likely to be poor, to live in geographically isolated, disaster-prone or ecologically degraded locations, and to lack the benefits of effective local government and infrastructure. Climate change adds another formidable challenge, especially in water which is essential in the human society and the natural

climate system.

It is critically important to recognize the fundamental linkages among water; land use, including deforestation; ecosystem services; and food-, energy- and health- securities. By sharing coordinated, comprehensive and sustained observations and information for sound decision making, we need to develop effective collaborations for working together among different disciplines, sectors and agencies, and then, a holistic view of the continuity between environmentally sustainable development, climate change adaptation and enhanced resilience. And in doing so, it is critical to enable *end-to-end* cooperation among policy-makers, scientists, engineers, economists, water managers, decision-makers, local communities and other stakeholders.

Capacity building is indispensable for good governance. Individual capacity should be developed not only to improve professional skills but to broaden views and perspectives in coordinating with people and institutions out of "water box". The use of water by different sectors (agriculture, energy, domestic, industry etc.), and the way in which these uses affect each other, require cross-sectoral Integrated Water Resources Management (IWRM) approaches, not least to address adaptation (horizontal integration). Similarly, in the river basin context, IWRM bridges from the community/watershed level through the basin, across boundaries within and between countries (vertical integration).

Once a catastrophic event occurs, its negative impacts are not only to penetrate in a single country or region but also to widely spread out beyond its border in terms of economic impacts within the heavily interconnected international community. Such world-wide effects should be minimized by collective actions to encourage international solidarity by sharing vision, action and benefits where free-riders are not encouraged. Necessary actions should be taken at all levels including governments, communities and individuals where policy focus is shifted from passive/responsive approach to proactive/preventive approach. It is time to take further steps forward in order that no additional burden and regret is left to future generation in the sense that every possible effort is done under the responsibility of present generation. Continuous efforts to invest in capacity building and in proactive/preventive measures should be reinforced by 'green financing' to mobilize resources to keep the nexus of green growth stable.

3. Green innovation shedding light on future

To accelerate the coordinated and integrated efforts, we need to develop a holistic coordination capability, including observation integration, science and model integration, data integration & analysis, community of practice, cross-socio benefit area cooperation, management system integration, and sustained education framework. It is expected that there will be a large increase in the volume and diversity of observations from inhomogeneous data sources during the

next decade, especially in the fields of Earth observations and climate predictions and their applications to societal benefits. We need to develop a system for data integration and analysis that includes the supporting functions of life cycle data management, data search, information exploration, scientific analysis, and partial data down-loading. For improving data interoperability, we also need to develop a system for identifying the relationship between data by using ontology on technical terms and ideas, and geography.

In the fields of Earth observations, it is required to enhance both in-situ and satellite observation on a global basis. Since we may face very difficult situation that the collected global observation data would be huge volume with huge variety, it is essential that the Earth observation institutes should work together to collect and provide the global observation data. It is GEOSS that may play such a role in the wide international cooperation. GEOSS is developing information products and services on the global observation data that serve not only the nine societal benefit areas such as Agriculture, Biodiversity, Climate, Disasters, Ecosystems, Energy, Health, Water, and Weather but also the overarching tasks among these areas. We, therefore, need to keep on promoting the 10 year implementation plan of GEOSS. In addition, we also need to develop reliable climate model which make climate projection more precise both in global and local level in order to assess risks of climate change.

Whenever users within one societal benefit area have a dependency on observations and data products originating from another societal benefit area, it is essential that a comprehensive set of requirements is communicated. A “work bench”, a virtual geographical or phenomenological space where experts and managers work together to use information to address a problem within that space, can provide opportunities of sharing data, information and applications in an interoperability way, exchanging knowledge and experiences, deepening mutual understanding and working together effectively among various partners.

By providing many ways to connect its various components to serve specific needs, opportunities for interconnection between various societal benefit areas, and ways to share implementation experiences, we will be able to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained observations and information.

There is still a "disconnect" between the knowledge generated by the scientific community and the specific needs of stake holders. There is a need to bridge this gap, to re-examine the basic planning methodology, and to reduce the gestation period from scientific finding to practical implementation. It is critically important to encourage scientists to "translate" their findings into a language understandable by decision-makers, planners and other non-scientists; and to encourage decision-makers and other non-specialists to increase their scientific literacy. A more effective dialogue is required between scientists and stake holders, both to improve the dissemination of

scientific information as well as to learn from the experiences, knowledge and the needs of user communities. Develop and share knowledge bases of local-level data, information and best practices for directed action.

Governments should designate “water focal point” officials in green nexus sectors, e.g. food, energy, transport and environment. Water focal point officials are expected to share information and coordinate water related activities of the nexus sectors. Governments should also designate “international water focal point” officials. They are expected to share information and coordinate with international focal point officials and international institutions so that country actions can have synergy effects by regional and global coordination.