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Contribution by Thailand

to the CSTD 2019-2020 priority theme on “Exploring space technologies for sustainable development and the benefits of international research collaboration in this context

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1. What are examples of projects and/or policies in your country aimed at using space technologies for sustainable development?

Space Technology and Geospatial Technology are realized in Thailand's 20-year National Strategy as indispensable technologies especially for Eco-Friendly Development and Growth aiming to achieve sustainable development in terms of manifesting a healthy society, economy and environment and to create balance among these three factors.

EO is utilized as a tool to manage natural resources in Thailand. To preserve forest, the Royal Thai Forest Department has been using EO data to detect deforestation. Department of Marine and Coastal Resources uses EO data to monitor coastal erosion as well as detect marine pollution such as oil spill and marine debris. We also use satellite to monitor economic crops. Tele-Education is one of the early communication satellite applications in Thailand.

In 2018, Thailand has started its own space program, Thailand Earth Observation System – 2 (THEOS-2) with the objectives of

- 1) Devising an integrated area-based solution enabler platform by leveraging remote sensing technology, geospatial technology and big data analytics to address key priorities of Thailand as mentioned in the 20-year National Strategic Action Plan (2017-2036) and the 12th National Economic and Social Development Plan.
- 2) Being the national collaborative project among agencies, developers and organizations having their missions on applying geo-informatics in economic, social and environment aspects.
- 3) Being the national science and technology infrastructure for technology transfer and capacity building on geo-informatics and space technology.

THEOS-2 consists of the whole earth observation value chain from upstream to downstream. The upstream consists of satellite and image data from satellite constellation. The midstream consists of satellite control and receiving station, standard-product image processing system, archives, and system for data access and dissemination. The downstream consists of the development of models for analysis and synthesis, development of application system and solution system for area-based management and decision-making that support multi-level user access from policy-level to local users.

2. What are the main challenges confronted while trying to implement space-enabled projects and/or policies in your country or region?

The main challenge is the values realization of the space-related project comparing to its investment. The benefit of space-enabled applications is still limited to specific group of people not nationwide like public health or education. Consequently, resources have been put to address those priorities instead of investing in space-enabled projects.

3. How are recent technological developments – including machine learning, big data, cloud computing, CubeSats, nanosats, 3D printing – impacting the availability, accessibility, and/or cost of applying space technologies for the SDGs?

CubeSats and/or nanosats increase the availability of EO data whilst machine learning and big data broaden space technology applications making it accessible to larger group of users as well as lowering the cost to access the space technology applications.

4. How is increased private sector involvement in space science and technology impacting the value proposition for space exploration, Earth observation, and other space applications, particularly for developing countries?

Involvement of private sector will introduce innovative ways of utilizing space technology and yet create more value to space technology.

5. What are the most significant bottlenecks in the use of space technologies for developing countries? Key areas to consider include lack of awareness about potential developmental benefits, technology and skills gaps, lack of appropriate and targeted financing, national policy and governance challenges, and lack of intergovernmental and/or domestic cooperation.

The most significant bottlenecks are lack of awareness about potential developmental benefits and technology and skills gaps. For space-enabled projects to support decision maker to accurately address key priorities toward sustainable development of the countries, insightful evidence or information derived from satellite-generated data is expected as an alternative or a complement to traditional statistics. However, besides that traditional information already been produced from satellite data, for example, natural resources and land use land cover, deriving SDGs-related indicators from satellite-generated data are still under researches mostly done by government agencies. Participation of private sector in this kind of space-based application is still limit.

6. What are examples of policies, projects, and initiatives aimed at promoting international research collaboration in the area of space technologies for sustainable development? What are the main challenges confronted in implementing these projects?

Thailand by GISTDA work closely with United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) on developing the Plan of Actions on Space Applications for Sustainable Development (2018 – 2030). It is a regionally coordinated plan of action that harnesses space applications and digital innovations to help countries in Asia and the Pacific, particularly those with special needs, to achieve the Sustainable Development Goals. It contains collaboration on both research and operation on space applications.

The initiatives by Thailand for international research collaboration is ASEAN Research and Training Centre for Space Technology and Applications (ARTSA). ARTSA focuses to build up capacity on space technology applications among Southeast Asia countries via the cooperation with countries outside ASEAN. ARTSA confronts the same challenges as the implementation done UNESCAP.

The main challenge is gaps between countries. In Asia Pacific region, there are faring space countries such as China, India, Japan; the emerging space countries such as Thailand, Indonesia, Vietnam, as well as the countries that have few capacities on space such as some islands in the Pacific Ocean. The gaps include technology, human resource, financial resource, knowledge and skills. Hence, it is a difficult for faring space nations to help or support because there a lot of things to do or to invest. At the same time, it's a burden for least developing countries or some developing countries to spend on space.

Another challenge is the nature of space applications that is vary based on the geography. The models/knowledges/know how cannot be fully applied. It needs R&D to modify the model, for example, which means more work to be done by both sides.

More challenge is from policy level. In general perspective, space is something expensive, but its benefit is limited to some group of people not nationwide like public health or education. Consequently, policy makers put the space behind, and this affects the resources that necessary for space technology development for sustainable development.

7. What are effective forms of bilateral and regional collaboration (e.g., data sharing arrangements, joint research, capacity-building, joint launch of satellites) that enable space applications for the SDGs and/or address application bottlenecks?

From Thailand's experience, data sharing is desirable but difficult when implemented due to data policy of each agency. To amplify, data sharing is related to national security or politics so it cannot be fully shared, especially in some sensitive areas such as country border. In some cases, some countries may not share data because the data derived from satellites which are co-invest between government and private sector, so the data is for commercial.

Capacity building in the form of training, workshop, or seminar is usually of interest among emerging space countries. However, the success is case by case. Sometimes the training is from supply side not from demand side and end up with commercial products. After all, the capacity building on human resource is seemed to be popular and easy to be achieved.

The form which is recommended is fellowship program or co-developing. With this form, there would be insightful learning and practical implementation.

8. What are the actions that the international community, including the CSTD, can take to leverage the potential of space technologies for sustainable development, including through international research collaboration in this context? Can you give any success stories in this regard from your country or region?