HLPF 2021 SDG Learning session

**Integrating Recovery Planning from COVID-19
Building Resilience and Strengthening Policy Coherence
Towards the SDGs**

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STUDY PAPER

**Integrating Indigenous Knowledge and
Emerging Space Technology Solutions
for Building Resilience towards the SDGs**

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0.0 Abstract

This study paper is designed to guide participants at the HLPF 2021 SDG Learning session to help explore the potential of integrating Indigenous Knowledge (IK) with emerging space-based solutions in providing simplistic and operational tools for recovery planning from COVID-19 and building resilience towards the SDGs.

This study addresses the inequity of access regarding to emerging space technologies by Indigenous Peoples and acknowledges the political, cultural, logistical, and other challenges to address these concerns.

It describes relevant international frameworks and instruments in the context of role of Indigenous communities in building resilience. The role of space-based tools and solutions is highlighted that have potential to complement the knowledges of Indigenous communities.

It also includes the lessons learned during the Covid-19 pandemic with reference to the use of space-based solutions which are relevant to Indigenous communities, most vulnerable due to economic, social, and environmental dimensions of sustainable development.

The key messages comprise strengthening technical capacity of indigenous communities to consolidate existing knowledge. A dedicated multi-year structured program and integration framework are some of the major recommendations for the Global Indigenous communities to implement workable and replicable space solutions in pursuit of building resilience.

1.0 Introduction

Indigenous communities hold time-tested knowledge and coping practices developed through their intimate connection with their natural surroundings that make them resilient to climate-related and COVID-19 disaster.

These knowledges remain a living practice for many communities which can adapt in response to changing circumstances. IK includes an understanding of the relationships between Indigenous societies and nature, which have been tested by time and proven to be sustainable and successful in limiting the effects of hazards[1].

Therefore, Indigenous knowledge has a valuable role to play in building resilience and it should be recognized and protected accordingly.

All too often, mainstream scientific institutions have ignored Indigenous knowledge, and many successful local practices have disappeared because of non-Indigenous influence. Complicating any engagement between emerging space-based solutions and IK is the reality that Indigenous knowledges are diverse and dynamic, with location-specific relevance and accuracy.

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[1] (E/C.19/2013/14, para. 39)

If the knowledge of Indigenous traditions is combined with modern technology, this can create opportunities to build a more resilient community.

Indigenous Peoples argue that recognizing their diverse knowledges, Indigenous rights, and traditional environmental management systems are all necessary in the processes of empowered COVID recovery. In addition, they want events to be seen from the perspective of their Indigenous sciences and knowledges. They also want their own efforts in institutional and organizational strengthening, rights and safeguards, and voice and participation to be considered.

Indigenous Peoples further argue for data sovereignty, that is they seek control and ownership of data originating from their communities and territories.

Space technologies, from this perspective, can be seen as an extension of traditional data gathering approaches that can enable more accurate insights into disaster contexts. Indigenous Peoples have never eschewed new technologies; they simply request the right to adopt and adapt these technologies according to cultural values and their own self-determined disaster risk reduction priorities and strategies.

2.0 Rationale and Relevance

Among the many arguments that can be made for integrating Indigenous knowledge for building resilience towards the SDG's, four are especially compelling:
(a) Indigenous practices for risk mitigation can often be adapted for use by other communities in similar situations or environments,
(b) Use of community's traditional practices can encourage participation and empower the community to take lead in building resilience initiatives,
(c) Traditional knowledge and practices can provide valuable information about the local context to project implementation partners, including government agencies working on building resilience towards SDGs, and
(d) Non-formal dissemination of traditional knowledge can provide a model for awareness-raising and education on building resilience.

3.0 Relevant Mechanisms

As stressed by the Permanent Forum on Indigenous Issues, maintenance of Indigenous peoples' cultural and spiritual relationships must be a key priority in effectively addressing environmental or food catastrophes.

Furthermore, Article # 18 of the "Expert Mechanism" stipulates that Indigenous Peoples should consider investing in training for youth on new technologies that are part of early warning and GIS (Geographic Information System) mapping applications, e.g., training by Elders on how to adapt traditional knowledge.

It specifically calls to:
(a) allocate funds for training to use technologies and technologies so that they are accessible to Indigenous Peoples, and
(b) operationalize incorporation of Indigenous traditional knowledge related to risk resilience within technological aspects.

4.0 Complementing Space-Based Solutions with Indigenous Knowledges

Earth Observation (EO) satellites have been used as a tool for humankind for over 50 years and archives of the earth observation data provide valuable information to fill the data gap that exists in the communities that do not have well documented statistical data in past years.

Space technologies are integral components of the 4th industrial revolution technologies. such as EO, satellite navigation, satellite meteorology and satellite communication, integrated with emerging new technologies, provide critical inputs for communities to be more resilient and sustainable.

Here, we will explore scenario's for complementing space-based solutions with Indigenous knowledges using representative examples from various regions. Our discussions will focus on space data and its integration with other frontier technologies such as cloud computing and machine learning that enables analysis of complex datasets and derive meaningful information products. It should help stimulate collaborations between space data providers and agencies, and the Indigenous communities.

5.0 Examples and Lessons Learned from COVID-19 Pandemic

Covid-19 impacted significantly economy, food security, health, education system and ecosystems and has been challenging specifically for the Indigenous communities. Thus, the lessons from Covid-19 pandemic are important for preparedness and to build future resilience.

Disaggregating Indigenous-relevant data has been one of the many challenges of data management; EO and other spatially attuned remote-sensing technologies provided important technological advances for Indigenous communities to locate themselves and their territories in rapidly changing context of COVID pandemic.

Furthermore, information at various scale is needed to capture the systemic risk scenario and do predictive risk analysis for providing prescriptive analysis to help the decision-making process. Data on rates of infections among Indigenous Peoples are often not available, for example, the outbreak in Navajo Nation saw an infection rate ten times higher than the general population of Arizona.

Poor housing conditions and a lack of running water are contributing factors.[2] In Canada, the health sector has been accused as a 'patchwork of service' for Indigenous communities stemming from colonialism.[3]

The deployment of EO, when centered on Indigenous communities in service of their sovereignty, offers a solution to lack of accurate and relevant data. Space technologies, big data, analytics, models can be especially useful in building implementing scenario-based approaches. EO can play important role in addressing systemic risks that are transboundary, stochastic, non-linear, and uncertain.

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[2] UN Department of Economic and Social Affairs. 2020. The Impact of COVID-19 on Indigenous Peoples; Policy Brief #70. New York: Department of Economic and Social Affairs.
[3] Yellowhead Institute/Skye, C.. 2020. Colonialism Of The Curve: Indigenous Communities & Bad Covid Data. https://yellowheadinstitute.org/2020/05/12/colonialism-of-the-curve-indigenous-communities-and-bad-covid-data/

For Indigenous communities, relevant information delivered in a timely, culturally appropriate, and location-specific format is necessary for successful adoption of resilience measures. Space-based information can be used to influence the strategic process by identifying short-term, medium-term, and long-term needs, especially during this crucial pandemic situation.

Furthermore, the spatial nature of the space-based information provides a better understanding of the scenario and influence the decision-making process to help research, policies, and programmes to align to evidence. The concern is that there are many technologies, but these need to put to the use.

This is where the role of this training session is crucial to bring together all stakeholders including technical community, government officials, NGOs, industries, and people to learn from each other and help establish nexus from policy design to capacity building and institutional strengthening. Indigenous communities should be central to these efforts to ensure that no one is left behind, and this has become possible due to the revolution in social media.

EO technologies provided great service during Covid-19 pandemic by narrowing down to the possible affected places and generate precise risk maps to assist local authorities in establishing evacuation plans. These risk maps contributed to mobilizing relief parties and supplies effectively under the mobility and distancing restrictions imposed by the COVID-19. Such information earned the lead time to respond, which are particularly crucial under the COIVD-19 pandemic.

6.0 Space-Based Tools and Solutions Specifically for Indigenous Needs

Although very few, if any, exclusive space-based tools are developed for benefit of the Indigenous community in the context of building resilience, there are several tools accessible that are relevant to integrate their knowledge and complement to the indigenous community.

EO technologies are now becoming more affordable due to ample availability of open-source satellite images, free and cloud-based software tools as well as free capacity building resources like recommended practices and MOOCs. One such MOOC titled "Geospatial Applications for Disaster Risk Management" is recently launched by UNOOSA as a free and self-paced learning programme[4] and will covered during this training session.

In current scenario, Indigenous community, if enabled with decent internet linked to desktop/laptop, can effectively use EO solutions. In the Post-Covid-19 era, people have developed an aptitude of using online platforms for e-commerce, shopping, education and learning at all levels. This new normal pave a great way to transfer of technologies and capacity building. This vision is also presented in the UN Secretary-General 'Roadmap for Digital cooperation'.

This training, however, suggests more efforts to develop customized tools/products in the interest of Indigenous community.

Some of the tools that can be potentially used for benefit of Indigenous community are described below:

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[4]   https://un-spider.org/news-and-events/news/launch-phase-ii-mooc-%E2%80%9Cgeospatial-applications-disaster-risk-management%E2%80%9D

6.1 NASA Earth Applied Sciences Program: Indigenous Peoples Pilot[5]

NASA Tool for Disaster Readiness & Resilience Program promotes the use of Earth observations to inform disaster risk reduction activities on a global scale. The NASA Indigenous Peoples Pilot (https://appliedsciences.nasa.gov/indigenous-peoples-pilot) engages with Indigenous communities to foster ethical and culturally relevant space for the use of Earth observations in monitoring, mapping, and managing natural and cultural resources.

6.2 European Space Agency Disaster Risk Reduction-EO4SD DRR

The ESA initiative, "Earth Observation for Sustainable Development (EO4SD)" with a focus area dedicated to disaster risk reduction (EO4SD DRR) promote development of EO services for supporting the implementation of DRR in International Financial Institutions' (IFI) projects (targeted to Indigenous Peoples) with actionable information improved decision-making.

6.3 Emergent EO Tools: Big Earth Data

The Indigenous community can benefit information derived from EO data and its modelling across spatiotemporal scales. In recent years, technological developments from other areas such as AI, machine learning have been transferred to the remote sensing world, producing a somewhat revolutionary effect across the spectrum of activities in DRR applications.

To this cause, the work of UNOOSA and ESA on producing a Space Solutions Compendium[6] may act as a practical tool for Indigenous communities to identify how space can support their efforts towards sustainable development. It will help developing countries incorporate space solutions in their strategies. UNOOSA and ESA can leverage their expert knowledge and networks to identify relevant space applications and show how these can be used in a variety of contexts.

7.0 Key Messages

Following key messages can be derived from the above discussion.

There is a need to:
a. Promote real-time access to usable information products generated from EO data and in situ information through information and communications technologies (such as mobile phone) to enhance participation of Indigenous communities in DRR.
b. Improve dialogue and cooperation among EO and Indigenous communities, other relevant stakeholders, and policymakers to facilitate their interface in effective use of EO products in DRR decision making.
c. Ensure use of traditional, indigenous, and local knowledge and practices, in combination with EO products to formulate DRR policies, strategies, plans and programs.
d. Strengthen technical capacity of indigenous communities to consolidate existing knowledge that may be useful to assess disaster risks, vulnerabilities, and exposure to all hazards.

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[5] https://appliedsciences.nasa.gov/what-we-do/disasters/inside-disasters
[6] https://www.unoosa.org/oosa/en/informationfor/media/2019-unis-os-511.html

8.0 Recommendations

Following recommendations may help the process moving forward:

i.   A dedicated multi-year funded program for integrating EO and Indigenous Knowledge through a structured framework.
ii. Formulate consortium representing EO, and Indigenous communities to prepare and strengthen their work for building resilience towards the SDGs.
iii. Empower Indigenous youths to use EO technologies driven solutions with engagement through the institutions such as Indigenous Intercultural University to address the challenges with accelerated technological inequalities amongst the Indigenous Peoples.
iv. Address issues related to Indigenous community in the Space Solutions Compendium being developed by UNOOSA.
v.   Prioritize capacity development in local languages. Descriptions of research projects, consent forms, etc. should be adapted so they are culturally and linguistically appropriate in the local context, by participating communities and individuals (it's not as simple as "language").

9.0 Conclusions

The study gives realization that the knowledge possessed by Indigenous community is valuable and it can be further complemented by space-based solutions. However EO community needs to develop the perspective to integrate EO-based information products and knowledge of indigenous community. The study also underlined the gaps and practical barriers that impact the exchange between Indigenous and local community knowledge holders, and EO based tools and solutions developers and providers. The technological inequalities appear growing especially due to Covid-19 pandemic and it would be challenging to meet the SDG indicators without focused efforts.

10.0 Acknowledgement