

# Presentation to UN COPUOS STSC 2021 Session

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**Integrating Indigenous knowledge and  
Earth Observation based Solutions  
For Building Disaster Resilience**

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- **Need for the Initiative:** Integrating Indigenous Knowledge with EO Technologies.
- **What is Indigenous Disaster Risk Reduction:** Evolution from UN GP-DRR 2017, 2019.
- **Relevance of EO** and Ecosystem-based disaster risk reduction (**Eco-DRR**).
- Potential **Integration Strategies and Framework**.
- **Challenges** of Incorporating indigenous knowledge.
- **Opportunities** moving forward.



# Need for the Initiative: Pressing Issues

The Indigenous communities around the world are some of the **most vulnerable populations** to and possibly the least able to combat the negative impacts of climate change (e.g. location, land quality characteristics...)



They are disproportionately vulnerable to environment and climate change because many of them depend on ecosystems that are particularly prone to the **effects of extreme weather events** such as floods, droughts, heatwaves, wildfires, and cyclones.

# What is Indigenous Knowledge for Disaster Risk Reduction

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 natural hazards and disasters.



Indigenous knowledge, “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”.

**Credit:** Personal communication and input from Prof. Simon Lambert, Indigenous Studies at the University of Saskatchewan

# IK for DRR: Assessments from UN GPDRR 2017 & 2019

Recommendations from 2017 UN Global Platform on DRR in Cancun, Mexico and UN GP DRR 2019 in Geneva:



Traditional indigenous knowledge, values and culture are, in themselves, **important risk reduction tools** and should be incorporated into national and international DRR strategies.

**#MEXICOGP2017**  
22-27 May 2017 - Cancun, Mexico



Recognize and make better use of indigenous perspectives and knowledge by **incorporating these in UNDRR planning and programs.**



# Relevance of EO And Eco-DRR

## 01.

While EO based tools and solutions helps expand the knowledge for Indigenous communities, Indigenous knowledges also complements the EO technologies.

## 02.

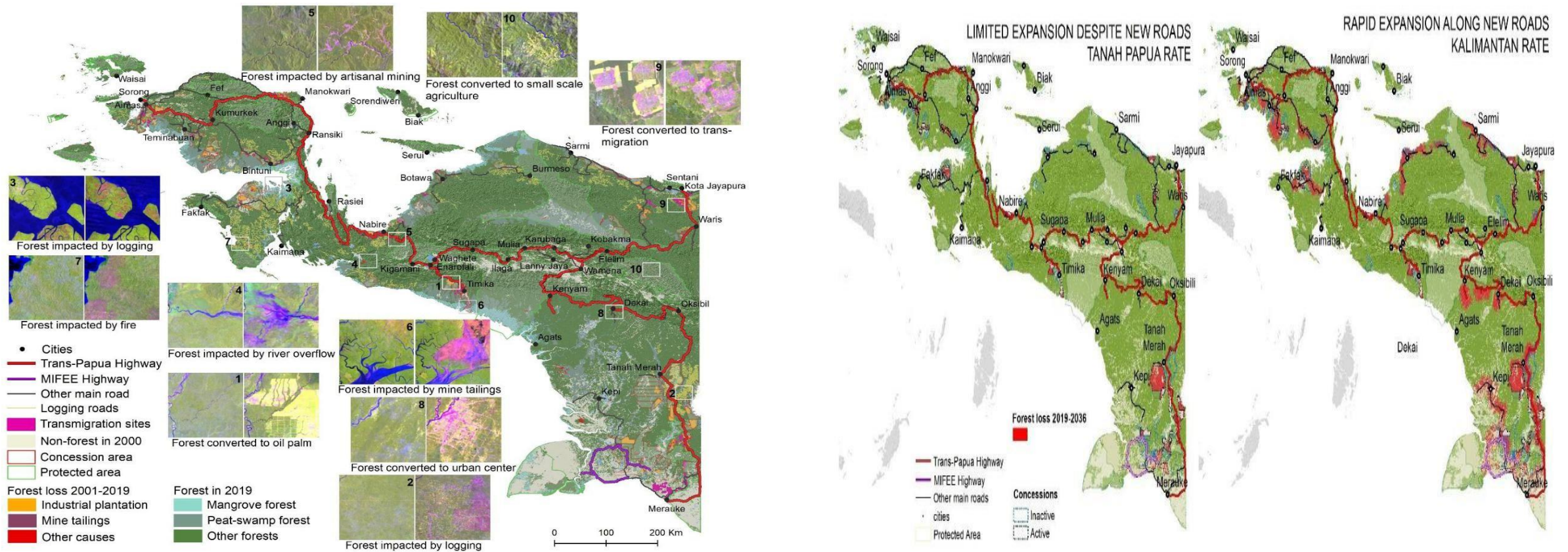
Ecosystem-based disaster risk reduction (Eco-DRR) is the sustainable management, conservation, and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development.

## 03.

Although indigenous communities have in-depth knowledge of the ecosystems they inhabit, the current scenario due to climate change and systemic risks calls for complementing to their knowledge based on scientific understanding of ecosystems

# Relevance of EO and Eco-DRR

❖ Example of Forest conversion outlook to 2036 under two scenarios in Indonesian New Guinea:



**Credit:** Adapted from David L.A. Gaveau, et al., bioRxiv, 2021, Forest loss in Indonesian New Guinea: trends, drivers, and outlook

# Potential Integration Framework for IK and EO Solutions

## Local knowledge system

### Composed of

#### KNOWLEDGE TYPES

- Technical knowledge
- Ecological knowledge
- Historical knowledge
- Others

#### PRACTICES

- Individual, household and community levels
- Technical and non-technical
- Short and long term
- Others

#### BELIEFS, VALUES, WORLD VIEWS

- Socio-cultural, religious-belief systems
- Respect, reciprocity, sharing, humility
- Others

### Influenced of

#### STRUCTURES

- Levels of government - Private sector
- Others

#### PROCESSES

- Culture
- Institutions
- Policy
- Laws
- Others

### In context of

#### NATURAL HAZARDS AND OTHER SHOCKS

- Floods
- Earthquakes
- Landslides
- Others

#### GLOBAL FACTORS AND TRENDS

- Wars, conflicts
- Climate change
- Institutional, economic and cultural globalization
- Migrations
- Population
- Others

### Resulting in

#### DISASTER PREPAREDNESS AT THE LOCAL LEVEL

### Based on

#### OBSERVATION

- Nature and history of natural hazards
- Evolution of people's social and physical vulnerabilities to natural hazards

#### ANTICIPATION

- Forecasting and warning systems
- Time thresholds
- Escape routes and safe places for humans and cattle
- Roles, skills and key actors

#### ADAPTATION

- Human assets
- Socio-cultural assets
- Financial assets
- Natural assets
- Physical assets

#### COMMUNICATION

- Stories, songs, poems, proverbs.
- Taboos, ceremonies.
- Local art terminology
- Local
- Others

### With effects on

#### LIVELIHOOD SECURITY/ SUSTAINABILITY

- Income level and stability
- Food security
- Environment
- Others

#### COMMUNITY RESILIENCE BUILDING

- Sharing
- Learning
- Networking
- Diversifying
- Re-organizing
- Self-organizing
- Others



# Potential Integration Strategies for IK with EO Solutions



## STEP 1: COMMUNITY ENGAGEMENT

### Community engagement:

- Collaboration with community and stakeholders
- Identification of community goals
- Establishing a rapport and trust

## STEP 2: IDENTIFICATION OF VULNERABILITY FACTORS

### Identification of intrinsic and extrinsic components contributing to hazard vulnerability. Identified through:

- Community situation analysis
- Identification of priorities

## STEP 3: IDENTIFICATION OF INDIGENOUS AND SCIENTIFIC STRATEGIES

### Indigenous strategies:

- Past and present
- Examples may include: land use planning, building methods, food strategies, social linkages, and environmental strategies

### Scientific strategies:

- Past and present
- Examples may include: land use planning, building methods, food strategies, social linkages, and environmental strategies

## STEP 4: INTEGRATED STRATEGY

### Integrated strategy:

- Addressing intrinsic components to hazards
- Dependent on effectiveness level of each strategy identified



Reduced vulnerability

# Lessons Learned during COVID-19 Pandemic



- ❖ lessons learned during the Covid-19 pandemic by DRR community with reference to the use of EO-based solutions which is relevant to indigenous communities that are vulnerable due to climate extremes



- ❖ EO technologies provided great service during the disaster that overlaps with Covid-19 pandemic by narrowing down to the possible affected places and generate precise damage maps to assist local authorities in establishing evacuation plans.

# Challenges for Incorporating IK in EO Solutions



## 01.

There is a need to draw up baselines of the disasters that have affected Indigenous Peoples starting from 2015 to 2020 and the EO based tools and solutions to further attempt to compare them with the disasters that may occur in 2025 and 2030.

## 02.

Efforts are needed to derive simplified knowledge products that are outcome of research to create baselines and targets for Indigenous communities.

## 03.

Need to 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.

## 04.

Need to strengthen technical capacity of indigenous communities to consolidate existing knowledge that may be useful to assess disaster risks, vulnerabilities, and exposure to all hazards.

# Opportunities for Incorporating IK in EO Solutions

- ❖ Massive Open Online Course (MOOC) on Nature-based Solutions for Disaster and Climate Resilience (PEDRR and UNEP)



A dedicated multi-year funded program for integrating EO and Indigenous Knowledge, as part of the efforts towards implementing the Sendai Stakeholder Engagement Mechanism (SEM) work plan.

- ❖ Prioritize DRR capacity development in local languages

# Opportunities for Incorporating IK in EO Solutions

- ❖ Formulate consortium representing EO, disaster management and Indigenous communities to prepare and strengthen their work with climate and DRR for the timely implementation of Sendai Framework.



# Opportunities for Incorporating IK in EO Solutions



Empower Indigenous youths to use EO technologies driven DRR solutions with engagement through the institutions such as Indigenous Intercultural University to address the challenges with accelerated technological inequalities amongst the Indigenous Peoples.



Address issues related to Indigenous community in the Space Solutions Compendium being developed by UNOOSA.



Define and implement key role of women in the transfer of knowledge, especially through the Space4Women initiative of UNOOSA.

- ❖ This presentation is based on the Paper by CANEUS, FILAC and UNOOSA for the Global Assessment Report on Disaster Risk Reduction 2022
- ❖ The study was benefitted by initiatives and programmes led by Ms Simonetta Di Pippo, Director UN Office for Outer Space Affairs that includes Access to Space for All, Space4Women, UN-SPIDER, Space Solutions Compendium and conferences promoting space for sustainable development.



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