BioSpace25 - Biodiversity insight from Space
10 - 14 February 2025 | ESA-ESRIN | Frascati - Italy

Data Sovereignty and Ethical Approaches to Indigenous Knowledge in Space-Based Biodiversity Monitoring

Workshop Summary

Presenters:

- **Mario Vargas Shakaim** - Indigenous Shuar from the Ecuadorian Amazon
- **Diana Mastracci** - Space4Innovation & GEO Indigenous Alliance
- **Gabrielle Crowe** - Vice Chair & Secretary of Environmental Sciences in the Gabrielino-Shoshone Tribal Council of Southern California
- **Axayactazi Kuauhtzin** - undergraduate Earth Systems major at Stanford University, California, and graduate of Anawakalmekak School

Additional Co-Organizers:

- Kyla Dahlin – Michigan State University
- Erin Hestir – University of California Merced
- Adriana Uscanga – University of Minnesota
- Elsa Ordway – University of California Los Angeles

The workshop included presentations and small group discussions.
Remote participants –including an Indigenous youth contingent– also attended

Key Recommendations for ESA by the GEO Indigenous Alliance (GEOIA)

1. **Partner with the GEO Indigenous Alliance to Strengthen Indigenous-Led Earth Observation**
   - Established in **2019 at the UN level** and led by Indigenous leadership, the **GEO Indigenous Alliance** has been leading efforts to integrate Indigenous knowledge with Earth observation. We invite **ESA** to work in partnership with the GEOIA to strengthen Indigenous-led approaches in space and Earth sciences.
2. **Align ESA Projects with Indigenous Rights, UNDRIP, and GEO Indigenous Alliance Standards**
   - The GEO Indigenous **Alliance has set precedents** ensuring that all Earth observation projects respect **international treaties on Indigenous rights, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)**, and follow **Free, Prior, and Informed Consent (FPIC)**. We welcome ESA to align with these principles for ethical and effective collaboration.
3. **Strengthen Indigenous-Led Participation, Governance, and Workforce Development**
   - Indigenous leadership must be central to decision-making, governance, and access to funding in Earth observation initiatives. We encourage **ESA to support Indigenous data sovereignty** and invest in workforce development through capacity-building, leadership opportunities, and direct engagement with Indigenous experts in space and Earth sciences.

Take Home Messages from Group 1

1. Indigenous Data Sovereignty & CARE Principles

Data Sovereignty is Paramount. Indigenous communities have inherent rights over their data and knowledge. This goes beyond individual privacy and extends to collective rights over ancestral lands and cultural knowledge.

Challenges

- **Lack of Consent:** EO data is often acquired without prior informed consent, raising ethical concerns
  - "All EO acquisitions are ostensibly without permission."
- **Misuse of Data:** The potential for misuse, loss of CARE principles through data scraping, re-scraping, especially with the rise of AI tools, poses a significant threat.
- **Defining Ownership and Opt-Out:** Determining land ownership and creating mechanisms for communities to opt-out of data collection is complex and requires careful consideration. "Who defines whose land it is? What is ownership? How could someone/some group request to opt out."

Opportunities

- **Upstream Data Provider Engagement:** Working with data providers to implement guardrails and labels is crucial to enacting CARE
- **Local Context and Labelling:** Initiatives like the GBIF Indigenous Task Force and Local Context & Labels system are vital for providing Indigenous perspectives on land and data and can serve as models for the EO community
- **Space Agency Role:** Space agencies can enact policies and procedures to ensure CARE principles are applied

Take Home Messages from Group 2

2. Equitable Co-Production & Collaboration

Relationship Building is Key. The EO community must shift from extractive approaches to building relationships based on trust, respect, and genuine partnership.

Challenges

- **Colonial Structures:** Funding agencies, academic institutions, and EO agencies are all operating within colonial structures that were not built to support or incentivise this type of work
- **Parachute Science:** Researchers from outside a community must avoid "parachuting" in and conducting research without proper engagement. Not all Indigenous communities are minorities, many are majorities and parachute science is not taking into account local voices.
- **Lack of Funding & Time:** Flexible funding, reporting, and time are necessary to support long-term relationship building and collaborative work.
- **Fear of "Not Doing it Right":** EO community may feel paralyzed by the challenge of equitable engagement.
- **Focus on Rational Decision-Making**: A lot of science assumes people are rational decision makers, which does not acknowledge the nuances in decision-making in different cultures.

Opportunities

- **Co-Design & Co-Production:** True collaboration requires designing research projects WITH Indigenous communities, not just *for* them.
- **Moving Beyond Data:** Recognize that Indigenous knowledge is not simply data; it includes complex systems passed down through storytelling, which require cultural context
- **Empowering Communities:** Focus on empowering communities to use data and drive decision-making on their lands, not just participate in research

Take Home Messages from Group 3

3. Amazon Indigenous Earth Observation

Youth empowerment, long-term data projects, and respecting Indigenous governance will strengthen Indigenous groups' resilience and autonomy in addressing environmental and social issues.

Challenges

- **Lack of Connectivity:** Many Indigenous communities in the Amazon face a lack of internet connectivity, which hampers communication, education, and data collection.
- **Environmental Threats from External Actors:** Mining, logging, and other illegal activities in the region are sources of conflict and environmental harm.
- **Energy and Infrastructure Limitations:** For example, some communities have solar panels but not all.
- **Data Sharing and Trust:** Convincing local communities to share data with external organizations, particularly private companies, raises trust issues and requires consent through complex governance structures.

Opportunities

- **Technology Solutions for Connectivity:** Starlink offers a potential solution for internet connectivity, with discounts available, though it raises questions around data sharing and long-term agreements with private companies.
- **Indigenous Knowledge and Science Integration:** Integrating **Traditional Ecological Knowledge (TEK)** into scientific methodologies could help refine taxonomies and improve data accuracy.
- **Youth Empowerment and Education:** Technology can help **youth** stay in their communities while gaining education. Leveraging **remote learning** tools and **data collection initiatives** can build local capacity for innovation, leadership, and self-governance.
- **Collaboration and Global Support:** Collaboration with external organizations can bring valuable resources, while supporting local communities in their governance and decision-making processes.

Take Home Messages from the Workshop

4. Practical Steps & Future Directions

- **"Moving at the Speed of Trust":** Collaboration requires time and patience and cannot be rushed.
- **Opt-Out Mechanisms:** Explore and implement mechanisms to allow Indigenous communities to opt-out of remote sensing data collection over their lands.
- **Storytelling:** Recognize the importance of storytelling as a means of knowledge sharing and preservation: “Storytelling is an essential component to this.” Hold space for storytelling in collaborative projects.
- **Reframing Language:** Shift away from terms that reinforce extractive perspectives; consider referring to "resources" as "relatives."
- **Structural Changes:** Identify and advocate for changes in funding structures and research institutions that reinforce colonial practices.
- **Nagoya Protocol for EO:** Explore the possibility of extending principles of the Nagoya protocol to EO data beyond biological materials
- **Working Groups:** Establish working groups focusing on Indigenous engagement within agencies such as ESA

Yuminsajme
‘Aweeshkone xaa
Tlazocamati
Gracias
Grazie
Thank you