



# Making Space for Indigenous Knowledge: A Knowledge Synthesis on Weaving Indigenous Knowledge and Geospatial Technology for Sustainable Environmental Monitoring

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## Introduction

Indigenous Knowledge (IK) has long informed mapping and navigation practices that not only sustain Indigenous livelihoods and affirm land rights but also advance scientific understanding (Jessen et al., 2021). IK provides context and insight that enrich scientific data (Bruchac, 2014). While geospatial technologies may yield precise spatial data, IK offers deeper knowledge of place (Briggs et al., 2020). Yet unequal treatment of IK has long excluded Indigenous communities from direct participation in STEM research (Jessen et al., 2021).

## Case 1: The Kawerak's Ice Seal and Walrus Project (ISWP)

ISWP used Participatory Geographic Information Systems to document Indigenous Knowledge about seals and walrus. Kawerak and Oceana hosted a workshop where local experts reviewed data summaries and maps. These materials were shared with tribal councils, community members, and experts for feedback and recommendations. Sensitive areas were intentionally concealed to protect them from commercial exploitation, and communities could remove information they did not wish to share publicly (Gadamus, 2015).

**Issue:** ISWP did not build local GIS capacity, which may limit the community's ability to use mapping technologies in future projects.



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## Methods

I examined the following:

- Successful collaborations with Indigenous Peoples.
- The use of geospatial technologies by Indigenous communities.
- Similarities and differences among the cases studied.
- Best practices drawn from each case.

## Risks

- Indigenous Knowledge (IK) can be exploited or go uncredited.
- IK may be distorted or lost when filtered through Western research tools.
- Western scientific frameworks can constrain IK and limit genuine knowledge co-production.

## Case 2: NASA Earth Observations for Indigenous-led Land Management (EO4IM)

EO4IM was a collaboration among Conservation International, NASA, and Indigenous communities across the Americas. The project aimed to make advanced monitoring technologies—such as Earth observation data, remote sensing, and web platforms—more accessible to support Indigenous-led fire and forest monitoring, detect illegal extractive activities, and preserve cultural knowledge (Tabor, 2018). The initiative also contributed to the recognition of Indigenous land titles in Peru.

**Issue:** The project was not Indigenous-led. However, because geospatial training remained within participating communities, it may foster Indigenous-led research and local economic benefits in the future.

## Your Turn!

- How can Indigenous Knowledge and data be protected when weaving together Knowledge Systems?
- Which best practices do you think are most important?
- Are there other best practices that should be considered?
- Share any additional thoughts about the presentation!

## Case 3: The Näätämö River Project



Image: by courtesy of Snowchange Cooperative

**Skolt Sámi knowledge holder Vladimir Feodoroff in his favorite place.**

Led by the Skolt Sámi, this project restored salmon stocks in the Näätämö River—the second most productive salmon spawning area in the Fennoscandian North (Brattland & Mustonen, 2018). The project demonstrated both the strengths of Indigenous leadership and the limitations of Western science.



Image: by courtesy of Snowchange Cooperative

### Key Outcomes:

- Addressed shared concerns and reflected Indigenous values and needs.
- Fostered strong community engagement.
- Drew on generational Traditional Ecological Knowledge (TEK), leading to the discovery of the Southern Beetle (*Potosia Cuprea*) in the basin.

Fully Met	Partially Met	Minimally Addressed	Not Addressed

Best Practices	Case 1	Case 2	Case 3
Participatory research & mapping			
Weaving Traditional and Scientific Knowledge: coproduction of knowledge			
Inclusion of Indigenous Peoples in all parts of the process			
Language sensitivity			
General capacity building (information sharing)			
Sustainable capacity building/lasting impact			
Translated projects/documentation of IK			
Involvement in decision-making			
Technological capacity building			
Inclusion of IK			
Supported local economies			
Culturally sensitive education/adapted learning to local values to engage communities			
Indigenous and community led			