

A scenic view of a river flowing through a forested landscape. The foreground is dominated by large, dark, jagged rocks. The river flows from the left towards the right, with white water rapids visible on the right side. The background is a dense forest of evergreen trees under a clear sky. The overall tone is natural and serene.

# *Everything Flows and Nothing Remains:*

**Some Challenges in Gathering Indigenous and Local Knowledge of Water, and How to Overcome Them**

Humans have been pondering water and the meaning of knowledge itself through water, forever.

πάντα χωρεῖ καὶ οὐδὲν μένει  
“Everything flows, and nothing remains.”

δὺς ἐς τὸν αὐτὸν ποταμὸν οὐκ ἂν ἐμβαίης.  
“You could not step in the same river twice.”

“Water is life!”

Its nature requires us all to approach it with a curious mind and open heart.

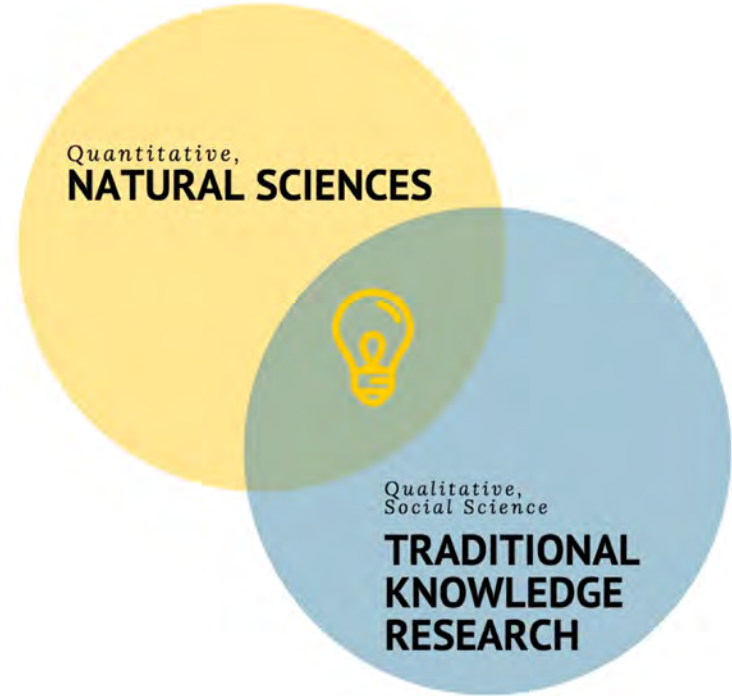


Left: Heraclitus. Right: copyright Christi Belcourt

# Challenge # 1 - Incorporating Indigenous Knowledges into Science-based Management

Incompatibilities between local, Indigenous, or traditional knowledges and science are often rooted in the inherent differences between qualitative and quantitative research paradigms, not in science vs TK itself.

We have to build a better bridge.



# Solution: Bring a Sense of Craft to Your Research

- Look beyond the science-based approaches to water management. Establish a community-based context for what good water is, and how it is made.
- Both **quantitative** stewardship (water levels/turbidity/contaminants, ie. numbers) AND **qualitative** monitoring (taste/smell/history/relationships/stories).
- Use the language that best conveys what water is to you.

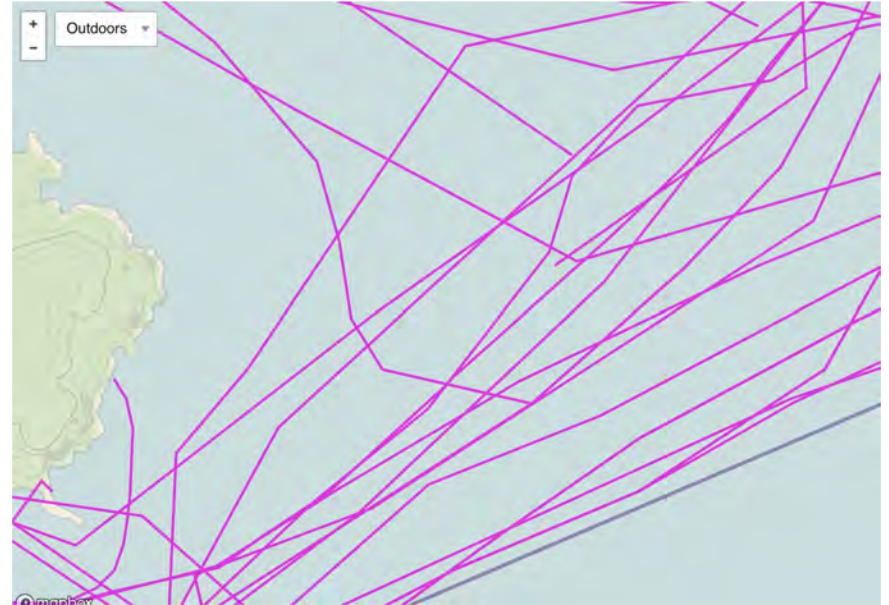


# Challenge #2 - Representing the Use of Water

Qualitative research methods can help establish a context for water management.

But conventional recall-based methods of land use and occupancy mapping do not serve the nature of water well.

A community's use of water is deep and extensive and multi-faceted.



Marine travel routes reported via semi-directed interviews

# Solution: Choose the Right Research Strategy

- Choose a research strategy that will enable you to gather the richest, thickest description possible.
- Do not exclude younger, active water users or knowledge-holders from your research.

Right: Marine travel routes gathered by harvesters using GPS-enabled mobile app (right).



# Community-based Monitoring

Community-based Monitoring:

Recognizes that local residents have a central stake in environmental monitoring, and undertakes to apply their local knowledge, skills and practices to the process.

A unique forum to generate interdisciplinary information, or a “multiple evidence base” that can include TK and Western Science.

## TYPES OF COMMUNITY-BASED MONITORING

Four common, overlapping structures of community-based monitoring, organized by the degree to which they are locally driven, capture local and Traditional Knowledge/perspectives, or are conventional science facing.



### Citizen Science

Conventional science research projects that enlist local residents as paid or volunteer data gatherers. Usually led by university or government scientists. Monitors may use scientific instruments to record data, but their perceptions, if included, are secondary.



### Community Participatory Survey

Surveys of local residents' perceptions of the status of and changes in environment, past and present. Surveys designed with varying input from community members, and analyzed using social science methods.



### Guardian/Ranger Programs

Specific members of a community, with specialized training, “keep watch” and record place-based observations or gather data/information. Activities are managed with varying degrees of outside involvement from governments or researchers.



### Cultural Systems-Based

Relies on the structure of the governing community, with the awareness that hunting, fishing, and harvesting communities are participatory monitoring systems. Or all the systems, CSM goes further in incorporating TK and local knowledge into its approach.

Degree of local participation, control, and data sovereignty

# Monitoring Types I

**Cultural Systems Based Monitoring:** Hunting, fishing, and harvesting communities are sensitive monitoring networks already. Local people document their food getting practices and observations based out of their knowledge and experience.

**Specialized Sentinel / Guardian:** Certain community members to “keep watch” and record place-based observations or gather data/information. Monitors are typically hired for the position and receive specialized training. Varying degrees of outside involvement with governments or researchers.



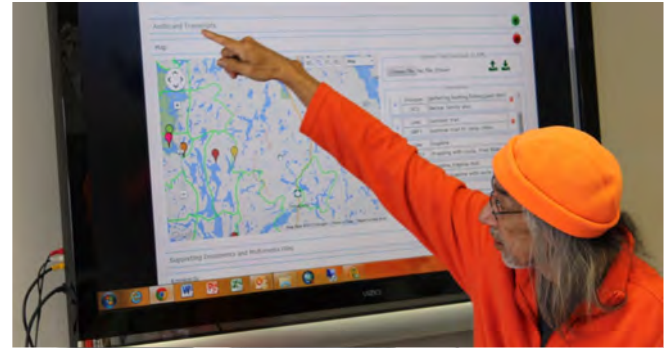
Photo courtesy: "Coastal Guardian Watchmen Confront armed trophy hunters to save grizzlies" National Observer, February 2014



# Monitoring Types II

**Community Participatory / Surveying:** Information is gathered by surveying local residents' perceptions of the status and changes of environment, past and present. Surveys designed with varying input from community, and analyzed using social science methods.

**Citizen Science:** Conventional science research projects that enlist local residents as paid or volunteer data gatherers. Activities are usually led by university or government scientists, and observers use scientific instruments to record data -- but not their perceptions.

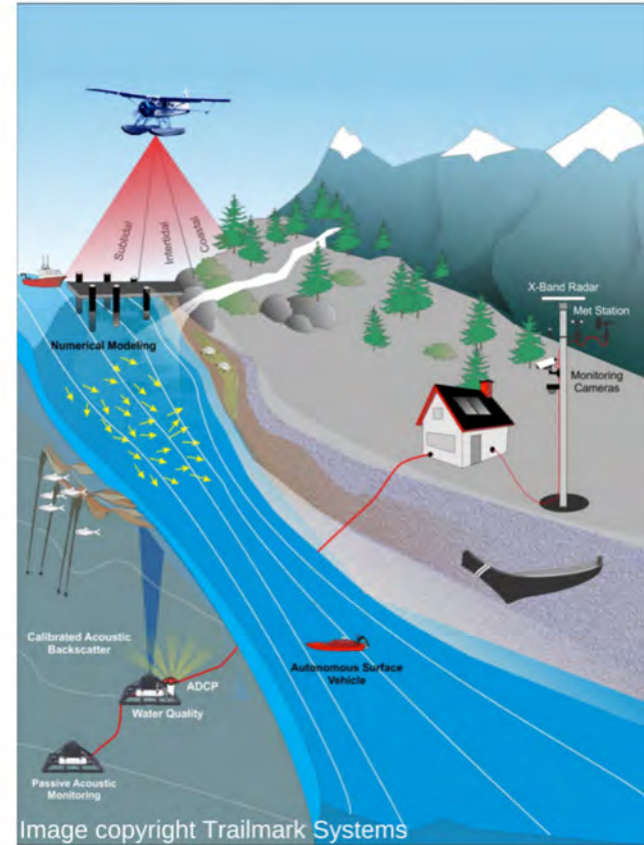


# New Approaches

Remote sensing with cultural  
systems monitoring

=

Novel insights into  
environmental phenomena



# Warning: Don't Become a “Handmaiden of Science.”

- It's great that so much water quality data is now being gathered by Indigenous people, often guardians or stewardship staff.
- But there should be much more to Indigenous participation in science than mere data collection.
- Consider following a working-together approach to knowledge co-production, or to create “situated knowledge.”
- Every aspect of the research program and management should be co-created: hypothesis development, data collection, analysis + contextualization, and application.

# THANK YOU!

A banner for Trailmark Systems software. The background is a photograph of a bison in a field with mountains in the distance. In the top left corner is a logo of a stylized leaf. In the top right corner is the word "MENU" next to a hamburger menu icon. The main text is centered and reads: "Software for Indigenous Knowledge, Land Use Mapping & Environmental Monitoring". Below this is a paragraph: "Imagine a system that organizes your existing knowledge, creates links between maps, recordings & information with built-in tools for field monitoring, decision making & referrals management. All in a web-based software that's easy to learn. That's Trailmark." At the bottom are two white buttons with red text: "Sign up for free!" and "Made by Trailmark Systems".

MENU

Software for Indigenous Knowledge,  
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Imagine a system that organizes your existing knowledge, creates links between maps, recordings & information with built-in tools for field monitoring, decision making & referrals management. All in a web-based software that's easy to learn. That's Trailmark.

Sign up for free!

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