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Six months in the Lhù'àän Mân' (Kluane Lake) watershed: Autobiographical reflection on the benefits of an extended data collection campaign

by Kristina Miller

INTRODUCTION

Lhù'àän Mân' (Southern Tutchone for Kluane Lake) is located in the southwest corner of Yukon Territory, tucked into the foot of Kluane Ranges of the St. Elias Mountains (Fig. 1). The lake is situated on the traditional territory of the Kluane First Nation, Champagne and Aishihik First Nations, and the White River First Nation. It is home to three communities: Silver City, Destruction Bay, and Lhù'àän Mân Keyĭ (Burwash Landing). The lake and its watershed are culturally significant and provide sources of fresh water, fish, land animals for hunting and trapping, berries, and lumber. I am a PhD candidate in the Department of Geography at the University of Calgary working on an exploratory hydrology research project in the Lhù'àän Mân' watershed.

In May of 2016, Kaskawulsh Glacier retreat redirected the meltwater away from Lhù'àän Mân'. This event caused the volume of water in the 'A'ą y Chù' (Slims River) to decrease significantly, leaving the areas of the river valley that were previously under water dry (Shugar et al., 2017). Kaskawulsh Glacier runoff was the largest source of glacial water to the lake until then. By August, water level in Lhù'àän Mân' dropped nearly 2 m and has not refilled. This drastic change over a short time period drew a lot of attention and has raised questions in the academic and local

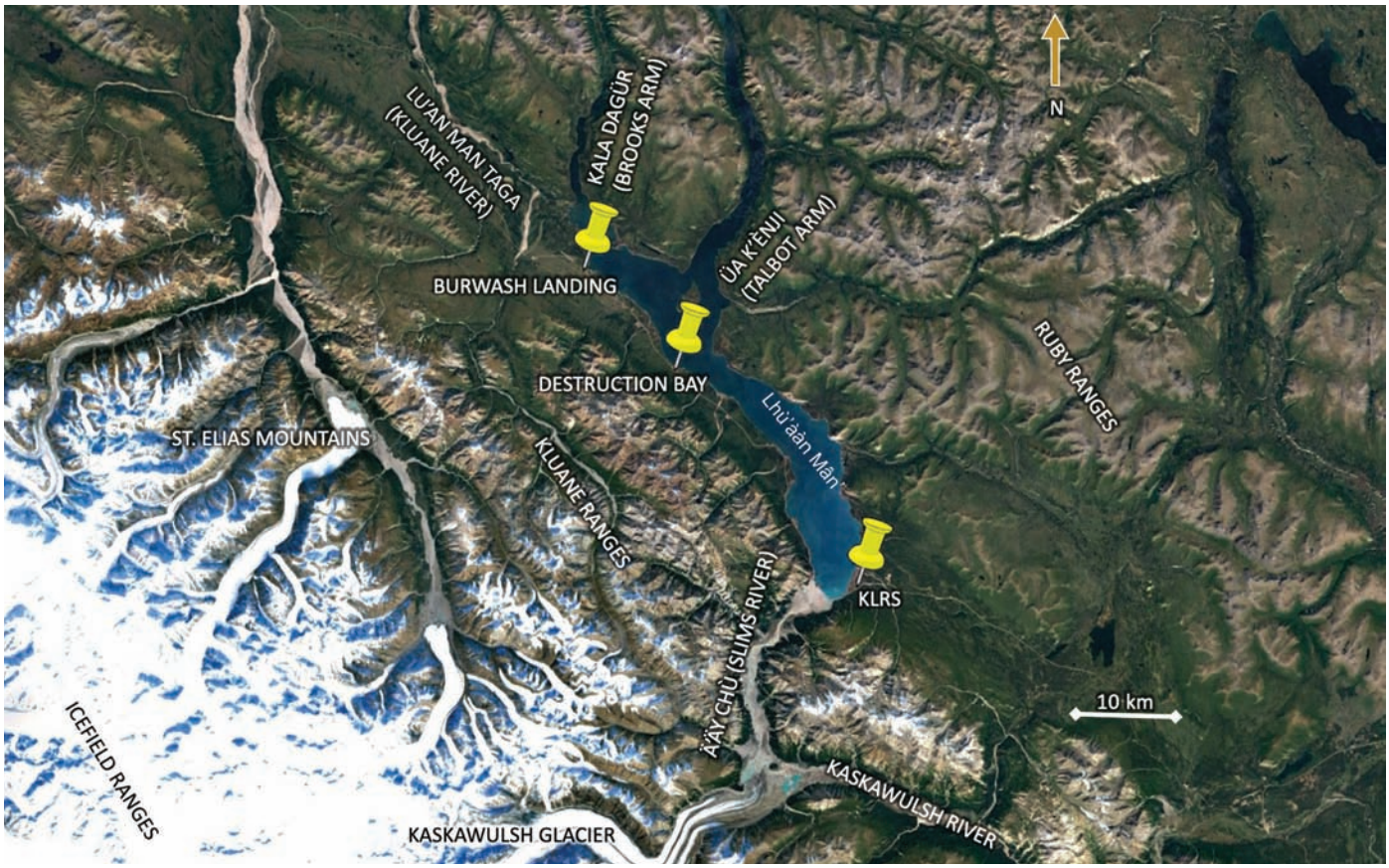

FIG. 1. Study area showing Lhù'àän Mân', Kaskawulsh Glacier, and the communities of Destruction Bay and Burwash Landing. (Map made in Google Earth).

communities about glacially-connected water resources in a changing climate.

Lhù'ààn Mân' watershed is complex, receiving water from glaciers, snowmelt, precipitation, and groundwater. Changes in climate, such as rising average temperatures, length of the melt season, and changes to precipitation patterns lead to changes in glacier melt timing and quantity, which impacts the availability of water downstream (Chesnokova et al. 2020). Determining the impact of these changes requires understanding the role of glacial water contributions to the watershed. My research goal is to determine where the water sources for Lhù'ààn Mân' are, and how water is transported on the surface and through groundwater pathways. This requires observations and measurements of streams, precipitation, and the lake water.

In 2021, I spent six months (May–October) collecting data for my project based out of the Kluane Lake Research Station (KLRS) located on the south shore of Lhù'ààn Mân'. This extended time in the Kluane region allowed me to collect more observations and data to capture even the small-scale changes in the watershed that I would have missed during a shorter data collection campaign. The extended season also allowed me to form connections with the local community, other researchers, and to observe unique features and changes in the natural environment. This was not only rewarding to me as a researcher, but also to the community where I work. I spoke with Pauly Sias, the Executive Director at the Kluane First Nation, to reflect on the mutual benefits for researchers and the community of dedicating extended time periods for collecting data and forming relationships at all stages of a research project. This essay includes quotations from my discussion with Pauly, and I have received her permissions to use excerpts from our conversation to represent the community's perspective in this piece. Herein "community" refers to the perspectives provided by Pauly, a citizen of the Kluane First Nation.

Fieldwork campaigns are often associated with pressure related to collecting high quality data, instrument performance, costs, time, and human resources among others. These pressures are further increased for graduate projects where time to collect observations, analyze data, and produce results is limited by program completion deadlines and funding availability. It is not uncommon for data collection campaigns to be limited to several weeks to gather data and observations needed to complete the project in a timely manner. However, when it is possible, there are numerous benefits to the researchers, community, and the relationship between the two. These benefits result from dedicating time to formulate the project, being present in the community, and sharing research findings.

RESEARCH PROJECT FORMULATION

When I began my PhD program, an important goal for my project was that my research would be relevant in answering the questions and curiosities of people directly impacted by it. In the spring of 2019, the Kluane First Nation hosted researchers and the local community for the second Kluane Lake Research Summit, a joint meeting with a goal to provide an avenue for two-way communication and information sharing. The science community reported on current research projects and sought feedback from the local citizens on future research needs. The Kluane First Nation extended an invitation for me to attend this meeting. I learned from the community and researchers about opportunities in hydrological research. Based on these conversations, I designed questions to make my PhD relevant to both my program requirements and the reseach needs of the local citizens.

In my conversation with Pauly, she spoke about the importance of caring about what the community asks for from the scientists. Finding shared interests between researchers and the community is important, as is ensuring that research questions consider the curiosities and knowledge of the local citizens. Community input and feedback enhances research projects. Pauly stated, "Acknowledging local people's knowledge has been considered not science, which is off-putting to anyone locally, because it's just a different way of looking at things." The local people have been interacting with the environment for decades and centuries, and their observations add value to the numerical observations scientists take. In this exchange, scientists are encouraged to share details of their research with the community. For instance, the Kluane First Nation newsletter welcomes contributions from researchers in the form of a one-page summary pamphlet or contributions to their social media pages.

The time involved in planning my project, attending the Kluane Lake Research Summit, and having a conversation with the Kluane First Nation before solidifying research questions and fieldwork plans strengthens my research project. Such flexibility in graduate programs, when possible, allows the project focus to shift if the researcher learns that they would better serve the community by adjusting their approach or methods. Knowing that I have the community's support to do my work, and that my work is relevant to the locals makes the project meaningful. I am grateful to the Kluane First Nation for providing a venue for information sharing and connecting researchers with the community, as well as connecting researchers to each other.

OBSERVATIONS ON THE LAND

I witnessed the change in the watershed from the time the ice on the lake broke up (Fig. 2), to the peak flow in rivers, to the time ice began to form in the rivers (Fig. 3). Part of my fieldwork involved visiting all accessible creeks that flow into Lhù'ààn Mân' once every week. Going to the creeks this frequently over the course of six months, I never grew bored of the repetition, I witnessed the response of creeks to changes in the weather and the snowpack in the mountains. Pauly emphasized that, "you don't get to see

FIG. 2. Ice breaking up on Lhù'ààn Mân', 11 May 2021.

FIG. 3. Ice forming on the bottom of Tasààn Zhat Chù' (Copper Joe Creek), 6 October 2021.

this when you're here for two weeks, that's just a snapshot, you need time to walk up the creek, to see where the water is going." Getting to know the study area intimately leads to observing changes on different scales and in different contexts and enhancing the final research project.

Having the flexibility that comes with extended time in the study area leads to more rigorous science. As Pauly emphasized, a short campaign provides a snapshot of the natural cycles and changes. This may be appropriate for some projects. However, in my project the goal is to learn about the watershed and how water moves through it. This requires employing multiple methods, having the ability to shift sampling schedules, and being able to look at the system over the course of time and space. The long field campaign captured changes and natural cycles over the open water season in the watershed.

RESEARCH DISSEMINATION TO THE COMMUNITY

Open communication involves sharing the processes and methods of data collection, which is made possible through being present in the community. "Having a long [field] season [and] multiple seasons leads to better community engagement. It's hard to plan those connections, [it's] important to be there and be present, and be around to engage," said Pauly. She suggested that researchers are welcome to stop into the Kluane First Nation office, take part in community events, or communicate their work via email. Working in a time of the COVID-19 pandemic, drop-in visits were seldom appropriate as the community offices were frequently closed to visitors. The most meaningful connections were spontaneous interactions I had with locals passing through on a visit to KLRS, or slowing down on the road to ask what I was sampling.

I deployed game cameras to collect observations of streamflow changes in the creeks, and with each camera I attached a note with my research license number and contact information (Fig. 4). Pauly said, "There are lots of cameras in the area for various projects and purposes, and if you don't have a contact that is identified clearly and a phone number […] it leaves people wondering what's going on in their backyard and feeling excluded. But ultimately it's just curiosity, people want to know why did you put it there, what are you studying?" A member of the community used the contact information to tell me about a camera that had been damaged. They found it while walking their dog. When I went to retrieve the broken camera from their home, we had a conversation that created space for me to answer questions about my work and the role of game cameras.

On a different occasion a local community member, who had seen me sampling water regularly, approached me to tell me about a groundwater spring on their property. I was invited to their home to collect a sample, they told me about the history of the property where they grew up, and shared how important the groundwater spring is. I was asked to share the results of the sample and was told that I was welcome to come back and collect repeat samples. This enhanced my sampling plan as I learned about a location to sample the groundwater in the area, and I also have an opportunity to give back to the community through my research by sharing the results.

Collecting observations over the course of several months created an opportunity to work with local citizens, sharing my research and learning from them. "Hiring locals gives an economic opportunity, but in the end, it is hugely beneficial to the researchers to have local connections. They're the tour guides and know the area" said Pauly. Lhù'ààn Mân' is very large, and conditions can change without warning, making it a challenging lake to navigate without appropriate equipment and knowledge of the water. To collect water samples from the lake, I hired a local boat captain and a pilot. Their knowledge of the area made it possible to safely collect samples (Fig. 5), and I was able to get to know them, share details of my work, and get their input and feedback. Pauly said that bringing local people into my research, like the local boat captains, leads

FIG. 4. Game camera and note with contact and project information.

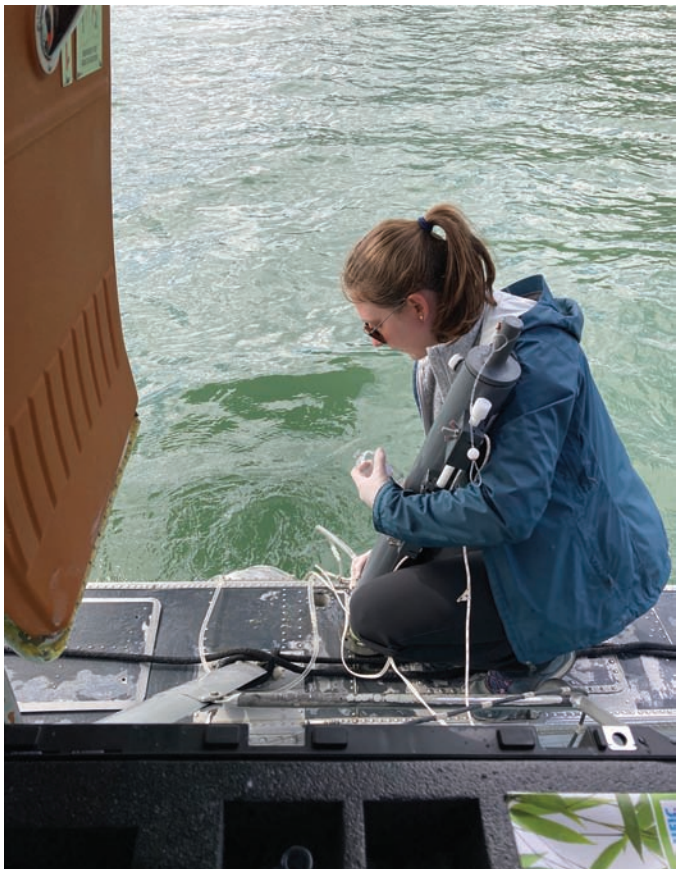

FIG. 5. Author collecting a water sample from the plane float in a location on Lhù'àän Mân' that would have been difficult to access without the plane, 28 July 2021.

to them becoming interested in the research. She said that it, "[introduces] the idea of research professionally to the locals, showing that it's cool…[and] the researcher gets a whole new introduction to the environment and things they didn't know."

Community relationship building does not end with engagement during fieldwork. When a project is designed with the community in mind, continuity and follow through is crucial. Pauly emphasized the importance of dedicated and constant communication as well as sharing the data and findings with the community. It is important to communicate results and report back in simple terms and about findings that are relevant to the community for the locals to understand the science.

CONCLUSION

> I've definitely seen a shift research-wise in the last decade or so […] it depends on the personality and the allotted time, if you only have two weeks and you're busy then it's really hard to make a connection with the community but there is a willingness on all ends. The community has responded really well to meeting new people and understanding. They just want to know what research is happening in their backyard, and sometimes there is a very specific traditional or local knowledge that can lead into the research and be really helpful, and other times it might just be a high level of curiosity, like [someone might say] "really oh you're researching that and why. I have nothing to add, but that sounds neat.
>
> Pauly Sias

Through my graduate program and experience in the Kluane region, I have seen how the allotment of lengthier time and resources communicates respect for community priorities. Pauly says, "Checking off the box is not enough, if you're being meaningful then you'll factor in a budget to involve local people, time for the researcher to write papers, and have community lunches. Universities have got to allow space for this." Spending six months in the study area is unusual, and is not always feasible. Building a connection with the community, being mindful of including the community's interests in formulating research questions, and sharing data and results in meaningful ways is possible and the efforts are noticed by the community.

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