Engaging Northern Indigenous Communities in Biophysical Research: Pitfalls and Successful Approaches

Laura Eerkes-Medrano,[1,2] Henry P. Huntington,[3] Arturo Ortiz Castro[4] and David E. Atkinson[1]

ABSTRACT. Guidelines and best practices to engage Indigenous people in Arctic regions in biophysical research have emerged since the 1990s. Despite these guidelines, mainstream scientists still struggle to create effective working relationships with Indigenous people and engage them in their research. We encountered this issue when we visited three communities on Alaska's west coast to study impactful weather events and the formation of "slush ice berms," which can protect towns from storm surges. As we worked to build relationships with residents of the towns, we found the existing guidelines are often helpful for telling us *what to do*—for example, they emphasize the importance of face-to-face communication—but researchers also need to think about *how to do it* (skills) and *how to be* (personal attributes). To demonstrate to Indigenous people that we value and respect their culture, researchers could learn to use language that is understandable and that reflects a collaborative rather than a top-down approach. We should be ready to adjust our schedules and to help the community we are visiting, rather than simply focusing on our own needs. We might look for benefits for the community and ensure residents understand and are satisfied with the research we are doing. Some of the necessary attributes we identified are curiosity, honesty, interpersonal awareness, empathy, flexibility, and openness. Although the skills and attributes presented here are useful to bridge the gap between cultures, we caution that there is no specific formula that can guarantee success.

Key words: coastal Alaska; community-centered approach; weather; slush; building trust and relationships; engaging Indigenous people; guideline limitations; semi-directive interview

RÉSUMÉ. Des lignes directrices et des pratiques exemplaires visant à faire participer les peuples autochtones des régions arctiques à la recherche biophysique sont publiées depuis les années 1990. Malgré ces lignes directrices, les scientifiques généraux ont toujours de la difficulté à créer des relations de travail efficaces avec les peuples autochtones et à les faire participer à leurs recherches. Nous avons fait face à cet enjeu quand nous avons visité trois collectivités de la côte ouest de l'Alaska pour étudier les événements climatiques percutants et la formation de « bermes de bouillie de glace » susceptibles de protéger les localités des ondes de tempête. Quand nous avons essayé de nouer des liens avec les résidents des diverses localités, nous avons constaté que les lignes directrices actuelles sont souvent utiles pour nous indiquer *quoi faire* (par exemple, elles mettent l'accent sur l'importance des communications face à face), mais les chercheurs doivent aussi penser à *comment le faire* (les compétences) et à *comment se présenter* (attributs personnels). Pour prouver aux Autochtones qu'ils valorisent et respectent leur culture, les chercheurs pourraient apprendre à employer du vocabulaire qui est compréhensible et qui tient compte d'une démarche de collaboration au lieu d'une démarche hiérarchique du sommet à la base. Il faudrait que nous soyons prêts à adapter nos emplois du temps et à aider la collectivité que nous visitons au lieu de nous concentrer seulement sur nos propres besoins. Il faudrait aussi considérer les avantages pour la collectivité et nous assurer que les résidents comprennent la recherche que nous faisons et soient satisfaits. Parmi les attributs nécessaires pour ces travaux de recherche, notons la curiosité, l'honnêteté, la sensibilisation aux besoins d'autrui, l'empathie, la flexibilité et l'ouverture d'esprit. Même si les compétences et les attributs dont il est question ici aident à combler l'écart entre les cultures, nous tenons à souligner qu'aucune formule particulière ne garantit le succès.

Mots clés : côte de l'Alaska; démarche axée sur la collectivité; conditions météorologiques; bouillie; édification de la confiance et des relations; participation des peuples autochtones; limites des lignes directrices; entrevue semi-structurée

Traduit pour la revue *Arctic* par Nicole Giguère.

---

[1] Department of Geography, University of Victoria, PO Box 3060 STNC CSC, Victoria, British Columbia V8W 3R4, Canada
[2] Corresponding author: Laura_em@telus.net
[3] Huntington Consulting, 23834 The Clearing Dr., Eagle River, Alaska 99577, USA
[4] Instituto Mexicano de Psiquiatria, Calz, Mexico-Xochimilco 101, San Lorenzo Huipulco, Tlalpan 14370, Mexico

INTRODUCTION

At a time when the incorporation of Indigenous knowledge is more relevant at all levels—from the global to the local—we see the need to support young researchers and new people entering the biophysical sciences who want to learn how to engage Indigenous communities in research and environmental monitoring. The Intergovernmental Panel on Climate Change states that adaptation to climate change requires an improved understanding of both scientific and Indigenous knowledge to produce effective solutions and achieve safe and sustainable use of ecosystem resources (IPCC, 2014). At the same time, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2017) promotes the inclusion of local knowledge in global climate science and policy processes, where governments support and encourage local adaptation and environmental monitoring initiatives. More than ever, newcomers to the field of biophysical science research recognize the value and importance of engaging Indigenous communities and building communities' capacity to do their own research.

Guidelines to engage Indigenous peoples in scientific research in Arctic regions date back to the 1990s and have continued to improve since then (e.g., NSF, 2004a; AFN, 2006; ITK and NRI, 2007; CIHR et al., 2014; IARPC, 2018). Specific insights are documented in numerous publications—for example, Crowell (2001), Pearce et al. (2009), and Wolfe et al. (2011) identify the following steps as important: engaging face-to-face, early and ongoing communication, and hiring local people when conducting research. Huntington et al. (2011) suggest the key elements for a successful collaboration based on trust and respect are a) the right personality, b) the right local partners, c) collaborative field work, and d) paid local researchers to collect high-quality data. Kendrick (2003) and Huntington et al. (2010) emphasize the importance of cross-cultural communication to develop trust and build common ground.

The need for cross-cultural communication has been acknowledged since the 1980s in the areas of health, land management, and land use planning (Scollon and Scollon, 1980; Wolcoff, 1987; Gallagher, 1988; Noland and Gallagher, 1989). Collaboration with Indigenous people also depends on individual attributes (Huntington et al., 2009), such as background, religious adherence, family clan, age, education, gender, and roles that people play in their community. Collaboration not only involves the time required to build trust, discuss research objectives, collect data, and synthesize results, but ideally also the budget to conduct long or repeated site visits, provide food for public meetings, and hire local residents to take part in the work.

Despite the improvements made on the approaches for engaging Indigenous people in biophysical research, several challenges remain (Felt and Natcher, 2011). At the core of these challenges is a lack of trust resulting from a history of misunderstanding and miscommunication between Indigenous people and researchers (Gearheard and Shirley,

2007; ITK and NRI, 2007; Pearce et al., 2009; Wolfe et al., 2011). Inuit Tapiriit Kanatami (ITK—an organization with the goal of protecting Inuit rights and interests in Canada) and the Nunavut Research Institute (NRI) produced a comprehensive list of concerns about scientists from an Indigenous perspective (ITK and NRI, 2007). According to Wolfe et al. (2011), lack of trust may also result from a sense of misappropriation of traditional knowledge. These above-noted studies reflect the importance of establishing trust and emphasize that trust is affected by past experiences and interactions. From an ethics perspective, the Canadian Interagency Advisory Panel on Research Ethics guidelines suggest that Indigenous peoples may not trust researchers because research is often planned outside the communities and developed with little Indigenous input (CIHR et al., 2014).

In the social sciences, a move to conduct work with communities rather than on communities—community-based participatory research (CBPR)—has developed since 1990 (Minkler, 2014). This approach has at its core research planned with a community's input. While several authors emphasize different approaches to CBPR (Israel et al., 2008), in this project we applied three of the elements identified by Minkler (2014): (1) ensuring the research topic is important to the community; (2) engaging community members throughout the research process; and (3) facilitating community capacity building, in this case by establishing a weather station.

The research that provides the context for this paper took place in three communities on the west coast of Alaska. The west coast, defined for this study as the region between Bristol Bay and Wainwright (Fig. 1), is frequently affected by impactful weather events. The sea ice cover that used to form in October (Eerkes-Medrano et al., 2017) is now forming in December, leaving increasingly larger areas exposed to storm impacts (Carole Sookiayak and residents, pers. comm. 2013; Frey et al., 2014), storm surges (up to 4 m), and wave action (Terenzi, et al., 2014). Added to these phenomena is the occurrence of a localized and ephemeral physical process that results in the creation of "slush ice berms." In this process, "slush ice"—water in which ice crystals are forming—piles high on the beach and solidifies, forming a natural solid barrier or berm that can mitigate surge impact (Eerkes-Medrano et al., 2017). Storms that occurred in November of 2009 and 2011 produced surges that were several meters high and would normally have caused damage to the communities at the eastern end of Norton Sound (Burke, 2009; Samenow, 2011) had slush-ice berms not formed and prevented serious damage. The formation of slush-ice berms is an interesting and impactful process that has received little attention.

The focus of this project was the acquisition of accurate data on specific dates and times of impactful weather events that affected communities' subsistence activities, in particular those events that led to the formation of slush-ice berms. Slush-ice berms are the result of a complex suite of processes, so it is not possible to monitor their formation using instruments alone. There is also no physical model
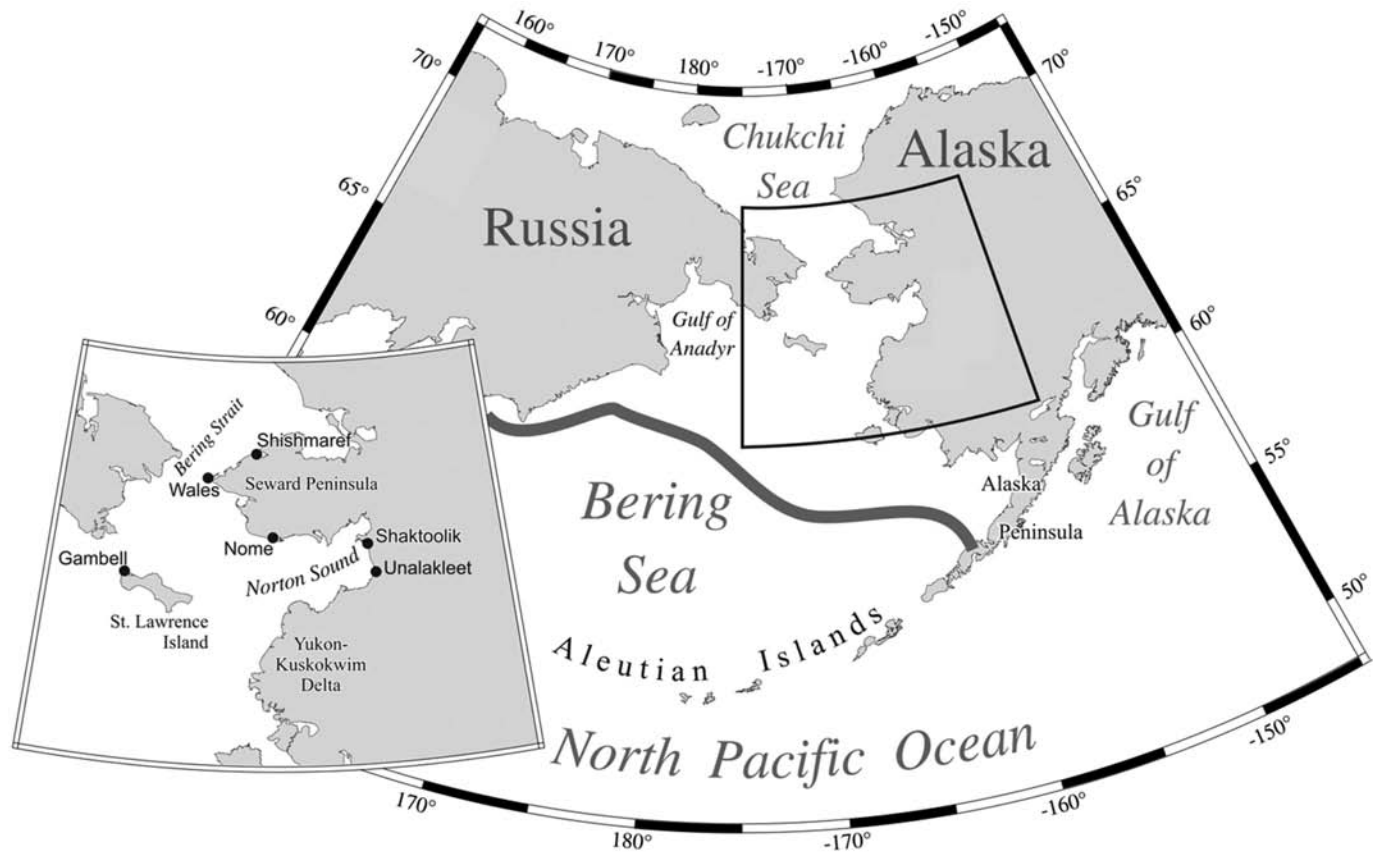
FIG. 1. Region of study. The broader area is the Bering and Chukchi Seas and their coastal zones. Inset map shows the study sites. The thick line reflects average maximum sea ice extent from 2001 to 2009.

describing their formation, so it was not clear what needed to be monitored. Using a webcam to monitor or record the formation of berms was also not a solution because such cameras are not sufficiently robust; they cannot record the extent, details, and impacts of the events, and at flat, slush-prone locations they would need to be set atop a tower. For these reasons we set out to gather from local residents specific information about the dates of impactful weather events and the formation of slush-ice berms (Eerkes-Medrano et al., 2017). We wanted to conduct synoptic weather analyses of these events so we could determine if it was possible to anticipate their occurrence and also the occurrence of slush-ice berms. If there were specific weather conditions that preceded them, it might be possible to incorporate such forecasting into a computer modeling/prediction process. As part of this project, we planned to provide and install a small weather station in each village for the community's use.

We made two site visits to each of the three communities. On the first visit, we presented the idea of the project to the community and met with council and town representatives to define and set the direction of the project. For specific input during the first visit, we carried out interviews with between five and nine individuals in each community. During our second visit, we presented the project analysis and results to community representatives and the community in general.

While conducting this work, we realized that the guidelines and best practices noted above are easily applicable when there is no history of resentment towards scientists in the communities, when things go smoothly, when budget and time are not an issue, or when research involves traditional knowledge or monitoring of environmental changes. In this project, however, we were not seeking traditional knowledge and did not require monitoring; rather, community participants were asked to identify specific dates and times of impactful weather events and the formation of slush-ice berms. We had limited time and budget for site visits (we could make only one visit per year), did not need to hire local experts, and encountered a community that was initially reluctant to participate. We had to overcome these limitations and past negative experiences to develop the trust necessary for community members to be willing to share details of their experiences on specific dates and times in order to conduct the weather analysis. We realized that research guidelines do not explain how to establish a personal connection that will lead to trust and relationship building when these limitations exist, and yet, without trust, it is often hard to achieve cooperation in any relationship. We felt that there was value in documenting and sharing the social attributes that allowed us to successfully engage residents in the three communities. These attributes could then inform

future projects that require community engagement. We also wanted to share the tools that allowed us to overcome the reluctance of one community to participate in this process and to create a strong relationship based on trust and respect.

Therefore, our objective in this paper is to describe how to establish the trust required to engage residents using a community-centered approach. We use a definition of "trust" from the management disciplines (Ring and Van de Ven, 1992), where it is described as confidence in the goodwill of the other partner. This definition includes a sense of moral integrity (Ratnasingam, 2003). We describe the process we followed to engage the communities in our project and identify three key elements of engagement and trust building: 1) *what to do*, which is covered in most research guidelines and best practices; 2) *how to do it*, where we identify actions we could take to implement the advice in the guidelines, such as making sure we were prepared, we communicated our intentions clearly, and we focused on outcomes (Table 1); and 3) *how to be* (how to develop a personal connection), where we identify attributes, such as willingness to learn, honesty and integrity, genuine listening, and personal awareness, that facilitate establishing the personal connection required to develop a trusting relationship (Table 2). These key elements are applicable to both social and biophysical research; in all cases, Indigenous people want to know what research is being conducted in their territories. Indigenous communities often find it disrespectful when they are not involved in or informed of research activities, even when these activities entail only the installation of instruments on their territories and not direct engagement.

We highlight some of the cultural differences and challenges encountered by Western scientists conducting research in remote Indigenous communities, and the approaches taken to address them (Table 3). While we recognize that every community and individual is different, and there will never be an approach that works in all cases, we hope this paper will be helpful for students, researchers, and policy- and decision-making bodies that aim for a greater integration of Indigenous knowledge. The challenges encountered are familiar to experienced researchers conducting research in Arctic communities; therefore this paper is written for biophysical scientists who are new in the field and are seeking additional tools for conducting research engaging Indigenous people. It is not intended for social scientists experienced in these techniques.

ENGAGING INDIGENOUS PEOPLE AND BUILDING TRUST

Preparation and Initial Contact

Contact was initiated via phone calls to the tribal councils or other main organizations, such as corporations, city administrations, or hunters' organizations. One purpose of these calls was to identify a contact or liaison person, who would function as a single point of contact for logistical issues, if community participants felt that having a contact person was the best approach. This person was selected by the main organizations in the community. These calls were followed by conference calls where the project was carefully outlined and an invitation to participate extended, which included an overview of each community's role in helping to define research objectives. We received three types of responses to the initial invitation. These responses were based on past experiences that residents had with researchers and on issues that the communities were facing at the time of the invitation. To maintain anonymity concerning the events that took place, the communities are referred to as C1, C2, and C3.

C1 expressed interest in participating since residents had been unable to conduct the spring walrus hunt because of bad weather and sea ice conditions; in fact, at the time of initial contact the town was in the process of declaring a state of emergency, and residents felt the project could benefit them.

C2 was receptive because we had worked there before and a positive connection had already been established. Since the town is very vulnerable to impactful weather events such as flooding and erosion during storm episodes, the residents were receptive to other work that might help them understand the phenomena.

C3 was not interested in engaging in any new research because the town had seen few tangible benefits from working with previous researchers.

We were interested in working with C3 in particular because this community is highly vulnerable to floods and erosion due to storm events. We also knew from previous work in the region that slush-ice berms saved this community from storm impacts in 2009 and 2011.

To understand the decision of C3 to decline participation and to explore possible options to overcome their reluctance, we invited C3 representatives to a conference call to talk about their experiences with researchers and discuss the project without committing to engaging in research. During the call, we put the project aside and focused on learning why the community was not interested in participating. This approach involved the use of various attributes described in Table 2, including being curious and interested (Table 2: 2.1), being good listeners and respectful (Table 2: 2.3), and showing personal and interpersonal awareness (Table 2: 2.7). We listened to concerns, which included a comment that "researchers come here, and we never see anything happening, so we do not want to have more research," and acknowledged their validity. Remaining calm and focused (Table 2: 2.6) was important, as was the ability to empathize with residents (Table 2: 2.8) and not become defensive or react negatively (Table 2: 2.6). We were aware of the importance of non-verbal communication (Mehrabian, 1972; Knapp and Hall, 2010), but because this was a conference call, we were unable to use non-verbal cues. Instead we paraphrased

TABLE 1. How to do it—Key actions identified to engage Indigenous people and build trust.

Actions	Description/Examples
1.1 Be prepared	• Gather as much background information as possible. • Before initiating any community contact, immerse yourself in the cultural, political, and economic aspects of potential partner communities. Prepare yourself for some of the questions and concerns that may arise. This helps to develop trust and build a relationship. • Read books about the culture of the people. • Become aware of previous and ongoing regional research. • Talk to other scientists conducting research in these communities. • Contact community members—particularly those suggested by scientists—who have been involved in research. • Check local newspapers and social media outlets, including Facebook, blogs, and YouTube videos, to become aware of current community activities and events. • Read local economic development plans and become familiar with the vision, values, and priorities of the community. • Use Google to learn about ongoing work being done by community residents. • Contact local schools and offer to present information about the research project to students.
1.2 Use appropriate language	• Ensure people and scientists are using the same terminology. • Use plain language. • Use re-framing to ensure your language reflects a collaborative approach.
1.3 Accept challenges	• Obstacles or challenges are not personal failures (e.g., meetings are not cancelled because of personal issues; cancellations are the result of circumstances).
1.4 Retain focus	• Issues/challenges will continually arise, so keep the focus on the larger picture. The way things were planned is not the only way to get things done. If trust has been built, residents are usually very helpful in ensuring that goals are met.
1.5 Show commitment	• Commit to being helpful at all levels, not only for your project but for anything you can help with. Identify opportunities to be of service—e.g., gather food for an Elder, help butcher an animal, help make ice holes, offer to take pictures during social events. • Ask first if it is okay to help or if you are being a nuisance.
1.6 Communicate	• Ongoing communication is a must. Be clear on roles, expectations, limitations, budget, and other relevant issues. • When discussing contentious issues, use empathy and paraphrasing, and use re-framing to highlight common interests.
1.7 Focus on the outcome	• Look for project benefits for the community, not only for the scientist. • Give appropriate credit to participants. • Simple gestures such as cooking meals for community members are appreciated. • Ensure the community understands and is satisfied with the outcomes of work being done. • Make project presentations at public meetings as required and in schools.

and reflected what we were hearing to show empathy and to communicate that we were listening and understanding the community representatives' feelings and emotions (Table 1: 1.6). According to Riess and Kraft-Todd (2014), remaining calm and focused, not taking things personally (Table 2: 2.6), and using the appropriate tone of voice and speed of speech (Table 2: 2.7) are all very important for achieving effective communication.

After listening to the community's concerns, we invited the representatives to talk about their worries specifically regarding weather. Our preparatory work (Table 1: 1.1) was relevant because it allowed us to discuss in depth the difficulties the community was facing, and the research work done by other scientists. Residents raised their concerns about impacts from storm events, including flooding and erosion from storm surges, and were interested to hear about our intent to investigate slush-ice berm formation. The formation of berms that protected C3 in 2009 and 2011 had been unusual occurrences, and residents wanted to learn more about this phenomenon, so they could feel safe during storms. Highlighting the common interest (Table 2: 2.2), we used collaborative language (Table 1: 1.2) and asked for residents' input to focus the conversation on ways we could collaborate to benefit the community (Table 1: 1.7) and reflect its priorities (Table 2: 2.9) in the research project, should the community choose to participate. The discussion included steps we could take

to ensure that past negative experiences would not be repeated, including clarifying roles, expectations, and budget limitations (Table 1: 1.6); ensuring the community understood and was satisfied with the expected outcomes and work to be done; and keeping the community informed by, for example, conducting presentations at public meetings and schools (Table 1: 1.7) and maintaining regular communication when not in the community.

The conversation also focused on the installation of a small weather station for community use that would allow residents to gather data on wind and temperature during impactful weather events. C3 residents felt they could leverage data from this station to assist in applying for grants for municipal work; for example, by documenting stronger winds and warmer temperatures during the most recent storm events, they could show the need for strengthened infrastructure. Community representatives and authors also discussed how results of the project could be used to improve forecasting of impactful weather events, which would help the community better prepare for such occurrences. After this conversation, community representatives decided to participate in the project.

Challenges Before Site Visits

Food at Public Meetings: Providing food at public meetings is an important trust-building activity because it

TABLE 2. How to be—Personal attributes to engage Indigenous people and build trust.

Attributes	Description/Examples
2.1 Be curious and interested	• Be willing to learn about other people and cultures and to value them.
2.2 Identify common interests– show that you care	• Focus on what people are interested in understanding or are being affected by. Identify opportunities to work together based on a common interest in a way that meets their objectives and not only your own research.
2.3 Be a good listener and respectful	• Avoid being rushed when interacting with people. Give them the time they need and show respect. • Practice genuine listening and respect. • Practice attentive listening, including paying attention to tone of voice and body language.
2.4 Display honesty/integrity	• Maintain congruency between what you say and do. Do not overpromise or do the minimum to comply with requirements; show a genuine willingness to engage people as equal partners.
2.5 Be trusting and trustworthy	• You need to trust yourself in order to trust others and to be trusted.
2.6 Be assertive, calm and focused	• Be ready to clarify situations and misunderstandings using a non-confrontational verbal and non-verbal language. Remain calm, focused, friendly, and respectful when dealing with difficult issues. Do not take things personally. Avoid becoming defensive or reactionary.
2.7 Cultivate personal and interpersonal awareness	• Be aware of religious traditions, personal biases, and also residents' personal and political agendas, and the roles that clans, families, and individuals play in the community. • Be aware of your voice and what it communicates. Indigenous people do not speak as fast or as loud as some researchers.
2.8 Be empathic	• Put yourself in the other person's shoes and express concern for others. Verbal and non-verbal communication and empathy are very important.
2.9 Be reflective, flexible, adaptable, and open	• Reflect on situations—avoid knee-jerk reactions. Be flexible, open, and ready to adapt to changes. Share ideas and information. Remember that community priorities are more important to them than your priorities. Issues/challenges will delay schedules but this does not mean that the project failed.
2.10 Be present and willing to engage with the community	• Find new options to engage with the community through social events in order to feel, sense, and understand what is going on in the community and what is relevant to the people. Let them observe you to get to know you.

relates to the community's value of sharing food (Noland and Gallagher, 1989). During the preparatory phone calls, community representatives in C1 and C3 requested that we present the project at a public meeting. C1 representatives specifically asked for Subway sandwiches (which would have to be brought in from Anchorage) and door prizes to be distributed to community residents who attended the meeting. It was important for us to be clear and honest about the budget and logistical constraints (Table 2: 2.4) and to be assertive about what could and could not be done (Table 2: 2.6). We said that we would prepare sandwiches and find ways to provide sufficient food at the meeting (Table 3: 3.1.1), and this contributed to a sense of trust that we understood the need to provide food for the people (Table 2: 2.5).

Employment and Compensation: All communities hoped that the project would generate employment benefits. It was important for the research team to first listen in a respectful way (Table 2: 2.3). We paraphrased (Table 1: 1.6) what we heard to make sure it was clear to them we understood their employment needs. We elaborated on this issue based on our preparatory work (Table 1: 1.1) to emphasize our empathy for their needs and an awareness of broader social and economic needs. At the same time, it was important to clarify up front that because of the nature of the research, there would not be funds to hire local residents (Table 2: 2.6). Since selected interviewees spoke English, there was no need to hire translators, and there was also no need to hire people to monitor the weather stations described below (Table 3: 3.1.2). We wanted to make sure that we were not creating false expectations (Table 1: 1.6) and it was important to display honesty and integrity (Table 2: 2.4).

Provision of Equipment: This project involved the provision of a weather station for community use. In C1, the community had a large weather station during World War II and was expecting similar equipment. In an assertive and friendly manner, we explained to them the type of equipment that would be provided, which was much smaller than they expected (Table 2: 2.4). The communities accepted the explanation and the type of weather station (Table 3: 3.1.3). This example emphasized the need for careful explanation to clarify expectations and avoid misunderstanding and disappointment.

Challenges during Site Visits

Westerners and Indigenous people have different cultural concepts of time and responsibility to community and family. For Westerners, time is a linear concept, with five work days, Monday to Friday, a work period usually ending at about 5 p.m., and punctuality being highly valued. In contrast, for Indigenous people in remote rural communities, their sense of time revolves around when a particular food is available, and their main focus is carrying out subsistence activities. They will hunt or pick berries until they have enough food to last until the next season, and any other activities will be put on hold until the hunting or food gathering is finished. In terms of community and family, Westerners tend to focus on their immediate

TABLE 3. Challenges encountered and the approaches taken to address them.

Project status and situation	Challenge	Approach
3.1 Before site visits		
3.1.1 Food at public meetings	The community may expect a certain type and amount of food that you cannot provide.	Openness to acknowledge the feelings of hunger and distress; state what the budget allows for and what the team is able to provide to meet the hunger needs.
3.1.2 Employment and compensation	Communities expect that local employment is generated by research projects.	Clarify that, unlike other projects, this one does not involve monitoring so does not require employees.
3.1.3 Provision of equipment	Community expectations in terms of equipment required are different from what the project intended to provide.	Be open to hear what the community would like to have and why. Discuss in a firm but friendly manner what can and cannot be done. If there is trust and empathy, communities are usually understanding and supportive.
3.2 During site visits		
3.2.1 Contact people have left town and it is not known when they'll be back	No contacts to conduct work and no information on next steps.	Take the opportunity to get to know the people and learn as much as you can from each one of them.
3.2.2 Meetings cancelled or postponed	Uncertainty about meetings taking place.	Build flexibility in the schedule. Having relationships with many members of the organizations in town is useful to get advice on how to proceed—unless they all leave town. Then the next best option is getting to know residents (see 3.2.1).
3.2.3 Weather affecting planes	Uncertainty about being able to conduct fieldwork.	Plan to arrive one or two days before meetings and stay one or two days after to allow for weather delays.
3.2.4 Misuse of authority	a) Liaison making unauthorized use of equipment or facilities. b) Community representative misrepresenting an authority he or she no longer has.	Acknowledge mistakes. Apologize when necessary. Address the specific issue in a firm but friendly way with the specific authority. Use non-confrontational language—e.g., Correct me if I'm wrong; I understand that…; What would it take to have things done…; Would it be acceptable if ...; Could I ask you some questions to check my facts? Don't assign blame; focus on the issues, not the person.
3.2.5 Visiting town at the wrong time of year for the project's objectives	Gather information relevant to understanding the community and its environment better.	There are always pieces of information relevant to science, and the community is always willing to contribute.
3.2.6 Using proper cultural practices and communication approaches	Choose the right forum to gather information. Recognize communication styles and cultural practices, including religion.	In some communities a public meeting is not the best forum to gather individual perspectives on certain issues, as only the leaders will be willing to be vocal on issues. Be aware of cultural ways to conduct meetings, such as including an opening and ending prayer.
3.2.7 Selecting interviewees and liaison person	Based on previous research projects conducted in town, council may have potential interviewees in mind who may not be the best candidates. Although the liaison person is a great help to open doors in the community, this person sometimes may not understand the project completely or may have a personal agenda.	Ensure open communication to be clear on project objectives and on what different participants can offer to the project. Communicate project needs to tribal representatives in an assertive and friendly manner.

family—parents, siblings, spouse, and children—while Indigenous people are much more involved with their entire community. Both of these cultural differences were apparent at various times on the research trips, as illustrated below. Meetings were cancelled or postponed because contacts left town to go hunting or because of a death in the community. These events required the researchers to take time to reflect on the situation, remain flexible and adaptable (Table 2: 2.9), and demonstrate their ability to be present with the community rather than focused solely on their own needs (Table 2: 2.10).

Cancelled Meetings: At the request of the mayor of C2, we arrived in that town on 24 August 2013, in time for a meeting with community representatives to discuss the schedule for meetings and interviews. Upon arrival we learned that our contacts were not in town. The community had experienced three weeks of rainy weather, and 24 August was the first sunny day, which gave residents an

opportunity to finally go caribou hunting. We were told that our contacts would be back three days later, on 27 August, the evening before our scheduled morning departure (Table 3: 3.2.1). After recovering from the surprise, we reflected on the fact that the community's need to go hunting was more important to the residents than this project (Table 1: 1.3). We decided to walk through town and learn as much as we could over the next three days by talking to the remaining residents in town, showing an interest and being curious (Table 2: 2.1), being good listeners (Table 2: 2.3), considering the different communication styles of people and the different roles they played (Table 2: 2.7), showing empathy as required (Table 2: 2.8), and sharing our interest in learning about community activities and valuing opinions (Table 2: 2.9).

As we talked to residents, we learned what was important to the community and how the research could be relevant. We also gave residents an opportunity to ask questions about the intent of our research and its potential benefits, and, ultimately, to observe and get to know us (Table 2: 2.10), which was an important step to develop trust, particularly given the short time allowed for the visit (Table 3: 3.2.2).

While walking, we met some hunters who had returned from a caribou hunt. When approached, the hunters' responses were that they did not want to be interrupted. They had to butcher their animal as soon as possible. We reflected on the importance of butchering animals and adapted accordingly (Table 2: 2.9). When we met more young hunters who had returned with their caribou, we offered to help butcher the caribou (Table 1: 1.5). The hunters were glad to have some help. We joined them and learned about the good and bad weather conditions that they had experienced while hunting during the year. We were invited to come back the next day to continue butchering, then join the main hunter and his family for dinner, talk to them about the research project, and learn more about how weather was affecting residents' subsistence activities. We reflected on the fact that our objective was of secondary importance to the residents due to their pressing needs, so we made the residents' needs our priority (Table 2: 2.9). We listened (Table 2: 2.3) and were able to empathize with them (Table 2: 2.8) and understand their needs (Table 2: 2.10). Our help with butchering allowed the main hunter to complete his task more quickly, and he was then willing to share his knowledge of weather impacts. Although not gained in an official interview, this shared information created an opportunity for us to learn more about the community's vulnerability to impactful weather.

Responsibilities to family and community are more important than other activities, such as a scheduled meeting with an outside researcher. Cancelled meetings can be a challenge when a researcher has scheduled a short visit with tight plane connections. On our second site visit to C1, a public meeting was scheduled for a Saturday afternoon, a day after we arrived. As happened on our 2013 visit to C2, we arrived on the first sunny day after a period of

rain that prevented residents from going hunting. We were informed that our contact would be back from hunting three days later. Once again, we reflected on the fact that the community's priorities came first and adapted our approach to the situation (Table 2: 2.9), working with other council members to arrange to have a building available for the public meeting in hopes it could still take place (Table 1: 1.4). The key contact came back on Sunday morning and agreed that the meeting could happen on Monday. However, early on Monday morning one of the villagers died. According to the cultural practices of C1 residents, when someone dies, public events are postponed until after the funeral. We donated the food that had been prepared to the grieving family and decided to meet with residents individually to discuss findings and invite them to provide feedback on project results as had been promised during the first visit (Table 1: 1.3; Table 2: 2.9). Two days after the death, the funeral was still not scheduled, and we had to go to the next community. The Indian Reorganization Act (IRA) council made an exception to the cultural tradition and called council members for a special meeting to provide us with project feedback (situation 3.2.2).

Weather Affecting Planes: No matter how much planning takes place, flight delays due to weather conditions in Arctic regions are always a factor to keep in mind when scheduling meetings, particularly in the fall storm season when planes may regularly be affected by poor visibility, strong winds, and blizzards. As we were leaving C1 for a meeting in C3, a storm came up, and we were unable to leave town for two days. We called our contacts in C3 and left the time for a meeting open until the storm conditions cleared up (Table 1: 1.3). Building flexibility into the schedule when travelling during the storm season is important (Table 3: 3.2.3).

Misuse of Authority: It is important to be as aware as possible of the internal politics and feuds in the towns. In the following examples, we encountered situations where town authorities were upset about interviewee selection, use of facilities, and even our presence in town. We were able to deal with these situations by practicing respectful listening skills (Table 2: 2.3), remaining calm yet assertive about our intent and the process we were following (Table 2: 2.6), being aware of different communication styles and individual agendas of people we were working with (Table 2: 2.7), and remaining open to change (Table 2: 2.9). Beyond respectful listening, attentive listening—including paying attention to tone of voice and body language—is also important; for example, a subtle comment or use of sarcasm regarding another person may provide a clue about a possible internal disagreement within the community.

In C1, a liaison person was selected and paid by the IRA council to help organize the public meetings and select the interviewees, determine the place to conduct the interviews, and provide refreshments. Unbeknownst to us, the use of the facility where the interviews took place, selected by the liaison person, had not been approved

by the building authorities, nor had they agreed to offer interviewees coffee. In addition, one interviewee had not been approved by the IRA council to participate in the interviews but was a relative of the liaison person and had been suggested for that reason. The liaison was also claiming compensation from the IRA council for additional interviews with relatives that had actually been chats at home with the liaison's family (Table 3: 3.2.4). In coordination with the IRA representative, we apologized to the building authorities and offered to pay for the cost of using the facilities and supplies. We also clarified to the IRA representative who the interview participants were so that they could be compensated (Table 2: 2.6, 2.7). Only these individuals were compensated by the IRA.

A similar example of misuse of authority occurred in C3. The second visit to this town included a public meeting, which had been discussed over the phone with a community leader for several months. Upon arrival, we were informed by this contact that a new leader had been in place for three months (Table 3: 3.2.4). We were told to get in touch with this leader but were not given the contact information. When we did make contact, the new leader was upset about our presence in town and stated that he/she had received no information about our visit and was not interested in a public meeting. The leader also said that all members of the town council were going whale camping for four days and would return the evening before our scheduled departure. We asked if we could hold a public meeting upon council's return, but the new leader made no commitment (Table 3: 3.2.2). After reflecting that we were dealing with internal feuds and political matters, and that the community had to focus on its main priorities, we accepted the situation and decided to seek feedback from the interviewees we had spoken to during the first site visit, using information and photographs gathered at that time—we had previously promised residents we would solicit feedback (Table 1: 1.3, 1.4; Table 2: 2.4).

At 5 p.m. on the evening before our departure, the council called to inform us that they had agreed to hold a public meeting at 7 p.m. as long as it did not take longer than 20 minutes. The call to a public meeting was announced over the radio and about 30 people attended. The meeting ran for more than an hour and a half. Residents expressed their satisfaction with the results of the research and said they would support any research project we wanted to undertake with their community. During the meeting we listened to the community's concerns of all types (Table 2: 2.3), showed genuine interest and concern (Table 2: 2.3, 2.8), remained calm and assertive even while discussing contentious issues that arose during the meeting (Table 2: 2.6), and focused on the community's priorities (Table 2: 2.9).

Appropriate Scheduling: Researchers interested in studying biophysical phenomena can benefit from scheduling their site visit to coincide with the phenomena they are interested in studying. In the case of this research, it made sense to visit the towns during storm conditions, so we could understand the weather impacts on activities, or during early freeze-up, when there is a likelihood of slush-ice berm formation. When we visited C2 in August and talked to residents and community representatives, it was clear that their thoughts were focused on summer activities, such as berry picking, fishing, and seal and caribou hunting. Because the weather was appropriate for these activities, the mood was very positive. However, it was not easy for residents to remember stormy conditions or impactful weather events during a fine sunny day, and they were not able to focus on storm impacts or slush-ice berms. They were able to share information on changes due to the lack of slush-ice berm formation because a break wall had been built along the shoreline, which resulted in the creation of a shallow beach. This information was still very relevant to the project (Table 3: 3.2.5).

Observing Proper Cultural Practices and Communication Approaches: Public meetings are a great way to inform the community about a project, but because public debate is frowned on in some cultures (Scollon and Scollon, 1980), such meetings may not be the best forum for gathering specific views from people. Different Indigenous groups have customary times and places for discussion. In some communities, only the representatives speak at public meetings and, because they are highly respected, no one challenges their point of view. In this situation, it may not be possible to reach a true consensus on a specific issue (Gallagher, 1988) or to fully explore the topic under consideration (Table 3: 3.2.6).

During public meetings, it is important for researchers to pay attention to verbal tone, body gestures, speech rate, pitch, silences, and humour, and to adjust their own style to match the speakers' style to create rapport (Scollon and Scollon, 1980). At a public meeting in C1, we adjusted our communication style to match the audience by lowering the pitch of our voice, reducing our talking speed, and using more and longer pauses and silences when addressing Elders (Table 2: 2.6, 2.7). Indigenous people tend to pause five to 10 seconds between sentences, while non-Indigenous people tend to pause between three to five seconds (Johnson-Joseph et al., 2006). Indigenous people may feel ignored or interrupted if Westerners do not adjust their pause period between sentences (Table 2: 2.3) or jump in during a perceived lengthy pause between sentences.

At the group level, we found it important to check the mood in the room. For example, in one community we were introducing the project's benefits, which included improving weather forecasting. A resident asked, "What is God's view about this weather forecasting?" We realized that a cultural practice was to commence and end meetings with a prayer, and participants were feeling uncomfortable about having a meeting without saying a prayer (Table 2: 2.8). We asked for a volunteer to say a prayer (Table 3: 3.2.6). The person who asked the question volunteered to say it. After the prayer, the residents were more active in their participation: leaders asked questions and began to talk about the impacts of the storm that was taking place during the meeting. Before

commencing site visits, researchers could ask their liaison or council members for advice on what is the customary religious procedure (Table 2: 2.7). It became apparent that in these communities it was important to apply the axiom "Do unto others as they'd like done unto them" (Alessandra and O'Connor, 1996:3).

Selecting Interviewees and a Liaison Person: Elders are highly respected in all communities as they are holders of knowledge, have survived many situations, and have a great deal of experience. As such, for this project, the liaison person and community representatives always suggested we talk to Elders. It was important to listen to council suggestions (Table 2: 2.3) and then politely but assertively (Table 2: 2.6) clarify the type of specific information required for the project. In this case, young active hunters who went out and experienced impactful weather conditions were the best candidates. However, during the research we found that men and women tended to focus on different aspects of impactful weather events. Women were particularly astute when it came to remembering dates and times of specific events. They tended to remember social and family events more easily than men and could place weather events in this context. For example, women were able to remember a storm that happened during a wedding or birthday celebration or while preparing for a potlatch, and therefore could pin down the dates of these impactful weather events. They also remembered bad weather that occurred when they were scheduled to take children or Elders to the doctor in Nome, as planes usually do not fly during bad weather, so the doctor's appointment would have to be postponed.

Men, on the other hand, contributed information about the height of a slush-ice berm; for example, how many "Hondas" (the local term for all-terrain vehicles) tall the berm was, how far into the ocean it extended, and when it formed. Young and active hunters were good at focusing on the short term—what is happening here today—and tended not to remember accidents or negative impacts of weather events. Women would remind their husbands about accidents they had while bad weather was happening. Beyer (1998) points out that, unlike men, women tend to recall more mistakes and negative experiences. Learning what type of specific information men and women were able to provide was very relevant to the project in terms of determining the specific dates weather events occurred and learning about slush-ice berm formation and characteristics (Table 3: 3.2.7).

Related to this knowledge about the type of information provided by people of different genders and ages, the liaison person in C3 became ill and was not able to facilitate the selection of interviewees, so other residents helped us find interview candidates. These interviewees were respected Elders who were willing to share their traditional knowledge about changes in climate. We asked the tribal council for permission to interview some women who were featured in a climate change video that we watched during our preparatory work. We trusted our knowledge on the best candidates for the research (Table 2: 2.5) and were able to communicate our needs to council (Table 2: 2.6). Council representatives were supportive of this request because these women had taken pictures of the slush-ice berm. The women were willing to share these pictures and information about the slush-ice berm and impactful weather events. With the pictures in hand, residents immediately recognized the slush-ice berm and remembered the conditions leading to the berm's formation. They also suggested other very good candidates who could be interviewed, an example of the snowball sampling approach in selecting interview participants (Bradshaw and Stratford, 2000).

Outcomes and Lessons Learned

Given the project's time and budget constraints and an initially negative response from one community due to its previous experiences with researchers, this project experienced first-hand the limitations associated with existing guidelines to engage Indigenous people in scientific research, particularly when using a community centered-approach. Guidelines outline what to do but do not set out how to implement them, nor do they describe the attributes required to develop a personal connection and build trust, to move beyond previous negative experiences, or to make people feel comfortable as researchers ask probing questions. Using the actions and attributes identified in Tables 1 and 2, we were able to engage people in effective working relationships in communities C1 and C3 and ask probing questions and gather data on the specific dates and times of impactful weather events and slush-ice berm formation. Residents in the three communities became volunteers, providing information to the project about when an impactful event took place and complementing previous information gathered during site visits.

The time of the visit to C2 was not conducive to people remembering specific dates of impactful weather events or slush-ice berm formation, so this objective was not met. However, we were able to gather relevant information on the physical beach conditions needed for slush-ice berm formation (see Eerkes-Medrano et al., 2017). The community-centered approach was useful because the communities identified specific impactful events relevant to them. C3 residents identified impactful rain as one of the problems affecting their fishing activities, so we conducted a synoptic weather analysis and presented results to the community. In C1, residents were concerned about the west winds piling up the ice along the northwest shore and preventing them from going walrus hunting. Here too we conducted a synoptic weather analysis and presented results to the community at a public meeting. This visit indicated that it is preferable to schedule site visits during the same season as the type of weather event researchers want people to remember: that is, in this case, it was better to visit towns during the storm season, after freeze-up, or during break-up, so that residents were in a frame of mind to think about the impacts of relevant weather events and how they are affected by them.

Another lesson was to use maps and calendars during the interview process to help people focus on the timing and the local impacts of events. We offered pen and pencil and invited people to draw the coastline and indicate how they would navigate when they were coming back to town and the wind started to blow, or to show the position of their boat while they were fishing in relation to the movement of the currents. The physical act of looking at maps and pictures or sketching helped the interviewee focus on the issue at hand, reinstating the context of an event and sharpening memory (Memon et al., 2010; L. Eerkes-Medrano, pers. observ., C1, August 2014), which in turn helped interviewees better remember specific dates and times. The use of photographs was very helpful to elicit memories about specific impacts from the events.

DISCUSSION

We were able to outline some of the limitations of guidelines and best practices for engaging Indigenous people in biophysical research and applying a community-centered approach. We found that these tools may have limited value if there is a history of resentment toward the scientist in the community. Once trust has been broken, it is hard to apply any type of guideline framework, since there is no room to establish early or face-to-face communication. In our project, the lack of time or budget to conduct long or repeated visits or to hire local people placed some limits on our ability to engage residents. While some projects have abundant funding and can hire several people in the community to coordinate and organize site visits and public meetings, others do not. Despite these limitations, our approach allowed us to establish a deep connection with the residents, which resulted in the trust and solid relationship required to complete the project and achieve its goals.

Guidelines to engage Indigenous people in research contain suggestions on *what to do* and insights on how to engage residents in research, but we found that more tools were required on this latter point. Researchers also need some suggestions on *how to be*: the personal attributes required to connect at the personal level and convey to Indigenous people a sense of value and respect for their culture and for them as individuals. As much as possible, we tried to collaborate with them on an equal level to build the trust that is at the core of a relationship. We took advantage of every opportunity to socialize in the community in the short time available, and to join in community activities that were available to us—to be there with them as much as possible in order to feel, sense, and understand what was going on in the community and what was relevant to the people.

In terms of *how to do it*—how to implement the guidelines, engage Indigenous people in biophysical research, and apply a community-centered approach—it is important to have cultural awareness and keep in mind the differences in language and communication patterns between Westerners and Indigenous people (Scollon and

Scollon, 1980; Gallagher, 1988; Noland and Gallagher, 1989; Kendrick, 2003; Huntington et al., 2006, 2010). One must also be aware of differences in education (Felt and Natcher, 2011), history, age and gender (CIHR et al., 2014), and religion, among other factors. Scientists are often oblivious to how our actions are perceived by Indigenous people and tend to conduct research at our convenience, without consideration for the community's priorities (e.g., during times convenient to us, even though this may interfere with subsistence activities or cultural festivities). These actions may contribute to communities' lack of trust for scientists because their priorities are being ignored (Wiita, 2006). This lack of trust leads to reluctance to participate in research projects, or worse, to communities' withholding information if they do participate (Bigby, 2006). When Indigenous people have had negative experiences with scientists, they naturally feel defensive or angry, and we need to be aware of that and respect their reasons (HCC, 2012). Indigenous people usually will not differentiate one group of scientists from another; if they have a negative experience swith one scientific group, they tend to generalize to other groups (C3 resident, pers. comm. 2006) and, to protect themselves, will not work with any of them.

Western education has also contributed to a communication barrier. Some of the language that scientists use in conversation makes Indigenous people feel unequal and disrespected, leading to a sense of alienation and a power imbalance (Bigby, 2006; HCC, 2012). Scientists also tend to have a different worldview. While Indigenous people consider their environment not in isolation but as part of a holistic view that integrates the environment with their emotional, mental, spiritual, and community well-being (HCC, 2012), Western scientists tend to focus on the specific phenomenon we want to study or the specific meeting we want to have (Scollon and Scollon, 1980)—the classic reductionist approach. Scientists may think that racism is not part of our approaches, but our impersonal and goal-oriented behaviours can be interpreted as discrimination to Indigenous people (HCC, 2012). When research projects focus on community needs only to get community approval (Wiita, 2006), or when scientists show no interest in getting to know the people in the communities and spend as little time as possible with them (Wiita, 2006; C3 resident, pers. comm. 2016), or when scientists pretend to know what happens in the community based on knowledge learned from outside sources rather than by observing and learning from the people in the community (C3 resident, pers. comm. 2016), these actions are usually interpreted by Indigenous people as a lack of respect and appreciation for their culture and do not help to build trust.

Hakanen and Soudunsaari (2012) outline the following components in trust building: regular face-to-face interaction, empathy, respect, and genuine listening. Other authors (e.g., Mishra, 1996) add attributes such as openness and willingness to change ideas and share information; caring, which would address the communities' concerns of being taken advantage of; and reliability, when it comes

to what the partner says and what they do. Gaining trust is also influenced by personal characteristics, such as age, gender, shared background and expectations (Zucker, 1986; Ratnasingam, 2003), and personality (Sicora, 2015), among other factors.

In this project, it was easy to initiate contact with the tribal council in C2 because we already had a positive relationship with the community, and the community had good previous experiences working with scientists. This "goodwill or rational trust" (McAllister, 1995:26) as it is known in the social sciences is based on previous positive relationships and experiences where scientists exhibited reliability and dependability in their work with a community.

In C1, residents were feeling vulnerable because of wind and ice conditions that prevented residents from walrus hunting. They had an expectation that collaborating on this project would be of benefit, which is also a form of "goodwill trust" (Sako, 1998). Also, this community had previous positive experiences with scientists, creating "rational trust" (McAllister, 1995). In C1 and C2, the residents also exhibited "competency trust" (Sako, 1998), showing a trust in the ability and competence of the researchers.

When a community has had a negative experience with scientists and there is mistrust, as was the situation in C3, the personal attributes required to develop a personal connection and build trust become more relevant, particularly when the budget is limited and initial contact must be made via phone calls. Our approach was to express empathy for the residents of C3 by developing a mental and emotional picture of what it would be like to experience what they had gone through (Singer, 2006). It was also important to ask them for guidance with such questions as "What would you have liked to see happen?" or "Would it work for you if…?" Researchers should give residents the time required to express their frustration. It is important not to rush the conversation but to listen carefully and express empathy. According to Konrath and Grynberg (2016), research on empathy has shown that after empathy is induced, a sense of genuine caring for the other party and a real interest in helping them in the long-term are also developed.

During public meetings, interviews, and site visits generally, we used tools such as respect, genuine and attentive listening, patience, openness, and sharing, which are integral to establish common experiences between scientists and local experts. Similar approaches have been documented by Huntington et al. (2006) and Mahoney et al. (2009). These actions also reinforced the values of cooperation and respect for others (AFN, 1993), empowered community residents, helped to build trust, and ensured all were working on an equal footing (Fienup-Riordan, 1999), which ultimately led to the acquisition of accurate data and meeting project objectives.

There will never be an approach that works in all cases all the time, as every community is different, and every person is different. Humans have many layers, but if we have a good cross-cultural understanding and an interest in developing empathy through personal and interpersonal awareness, there is the potential for effective communication and trust building. Once a base of trust exists, other challenges are easier to overcome.

CONCLUSIONS

This paper reflects on some of the many issues and challenges encountered when engaging communities and local observers in scientific research in northern communities. It also shows the benefits of working together to meet project objectives. We took elements of a community-centered approach, which required specific skills and attributes (including cultural and personal awareness and interpersonal communication) that allowed us to bridge the cultural gap and to work with the residents as a team. Taking this approach allowed us to move from the view that "We need certain information for our project" to a sense that "We can understand what the people's needs are, and we can work on a project that can be of benefit to the community and to the project's data-gathering goals." This meant working together and looking at this project as "our project."

Reflection, flexibility, openness, and cultural awareness were the most useful attributes during the many times that meetings and activities were cancelled or rescheduled. We regularly had to reflect on our assumptions about how things should go, challenge these assumptions, and understand that our priorities were not the communities' priorities, our timing and schedules were not as relevant as cultural practices. We came to see that as long as there was trust in the relationship and willingness for scientists and residents to work together, there would be a way to make things work out, even though this would only be apparent at the end.

We have discussed the limitations of existing guidelines for engaging Indigenous people in scientific research and emphasized the additional work needed on how to do it and how to be to develop empathy and trust in relationships. We found that trust and empathy were particularly useful when the focus of the research was gathering accurate and specific data. The skills needed to build effective relationships and a community-centered approach can be developed by any scientist interested in engaging Indigenous people in research projects.

The results of our project confirm that there is no specific set of effective skills in every situation and no "one size fits all" approach. Every situation needs to be assessed based on the circumstances, with researchers adapting their behavior in each case to seek an outcome that addresses the needs of both parties. In this way, research that engages communities can develop from a researcher-initiated project into a two-way collaboration that is beneficial to both parties. In our project, residents of the three communities told us that the site visits were a positive experience, and individuals from each community remain in regular contact with us, hoping for opportunities to continue working together.

As Eddie Ungott from Gambell said during the course of this project: "Why don't we work together? We can help each other!"

REFERENCES

AFN (Alaska Federation of Natives). 2006. Alaska Federation of Natives guidelines for research. Fairbanks: Alaska Native Knowledge Network, University of Alaska Fairbanks.
http://www.ankn.uaf.edu/IKS/afnguide.html

Alessandra, T., and O'Connor, M.J. 1996. The platinum rule: Discover the four basic business personalities and how they can lead you to success. New York: Warner Books.

Beyer, S. 1998. Gender differences in self-perception and negative recall biases. Sex Roles 38(1-2):103–133.
https://doi.org/10.1023/A:1018768729602

Bigby, J. 2006. Navigating cross-cultural communication. In: King, T.E., and Wheeler, M.B., eds. Medical management of vulnerable and underserved patients: Principles, practice, and populations. New York: McGraw-Hill. 91–99.
http://www.ucsfcme.com/2012/miscfiles/MED12007/King%20II_Ch09.pdf

Bradshaw, M., and Stratford, E. 2000. Qualitative research design and rigour. In: Hay, I., ed. Qualitative research methods in human geography. Oxford: Oxford University Press. 37–49.

Burke, J. 2009. Winter storm puts Alaskans on alert. Anchorage Daily News, 11 November.
http://www.adn.com/rural-alaska/article/winter-storm-puts-alaskans-alert/2009/11/12/

CIHR (Canadian Institutes of Health Research), Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada. 2014. Research involving the First Nations, Inuit and Métis Peoples of Canada. TCPS 2. In: Tri-Council Policy Statement: Ethical conduct for research involving humans. 109–138.
http://www.pre.ethics.gc.ca/pdf/eng/tcps2-2014/TCPS_2_FINAL_Web.pdf

Crowell, A.L. 2001. New dynamics of cultural research and representation in Alaska. In: Proceedings of the First Northern Research Forum: North Meets North, 4–6 November 2000, Akureyri and Bessasta∂ir, Iceland. 41–44.
https://www.rha.is/nrf/open-assemblies/akureyri-2000/proceedings

Eerkes-Medrano, L., Atkinson, D.E., Eicken, H., Nayokpuk, B., Sookiayak, H., Ungott, E., and Weyapuk, W., Jr. 2017. Slush-ice berm formation on the west coast of Alaska. Arctic 70(2):190–202.
https://doi.org/10.14430/arctic4644

Felt, L.F., and Natcher, D. 2011. Ethical foundations and principles for collaborative research with Inuit and their governments. Études Inuit Studies 35(1-2):107–126.
https://doi.org/10.7202/1012837ar

Fienup-Riordan, A. 1999. Yaqulget qaillun pilartat (what the birds do): Yup'ik Eskimo understanding of geese and those who study them. Arctic 52(1):1–22.
https://doi.org/10.14430/arctic905

Frey, K.E., Maslanik, J.A., Kinney, J.C., and Maslowski, W. 2014. Recent variability in sea ice cover, age, and thickness in the Pacific Arctic region. In: Grebmeier, J.M. and Maslowski, W., eds. The Pacific Arctic region: Ecosystem status and trends in a rapidly changing environment. Dordrecht, Netherlands: Springer Science+Business Media. 31–63.

Gallagher, T.J. 1988. Native participation in land management planning in Alaska. Arctic 41(2):91–98.
https://doi.org/10.14430/arctic1699

Gearheard, S., and Shirley, J. 2007. Challenges in community-research relationships: Learning from natural science in Nunavut. Arctic 60(1):62–74.
https://doi.org/10.14430/arctic266

Hakanen, M., and Soudunsaari, A. 2012. Building trust in high-performing teams. Technology Innovation Management Review 2(6):38–41.
https://doi.org/10.22215/timreview/567

HCC (Health Council of Canada). 2012. Empathy, dignity, and respect: Creating cultural safety for Aboriginal people in urban health care. Toronto: HCC.
http://www.healthcouncilcanada.ca/tree/Aboriginal_Report_EN_web_final.pdf

Huntington, H.P., Trainor, S.F., Natcher, D.C., Huntington, O.H., DeWilde, L., and Chapin, F.S., III. 2006. The significance of context in community-based research: Understanding discussions about wildfire in Huslia, Alaska. Ecology and Society 11(1): 40.
http://www.ecologyandsociety.org/vol11/iss1/art40/

Huntington, H.P., Gearheard, S., Druckenmiller, M.L., and Mahoney, A. 2009. Community-based observation programs and Indigenous and local sea ice knowledge. In: Eicken, H., Gradinger, R., Salganek, M., Shirasawa, K., Perovich, D., and Leppäranta, M., eds. Field techniques for sea ice research. Fairbanks: University of Alaska Press. 345–364.

Huntington, H.P., Gearheard, S., and Holm, L.K. 2010. The power of multiple perspectives: Behind the scenes of the Siku–Inuit–Hila Project. In: Krupnik, I., Aporta, C., Gearheard, S., Laidler, G.J., and Holm, L.K., eds. SIKU: Knowing our ice. Documenting Inuit sea-ice knowledge and use. New York: Springer-Verlag. 257–274.

Huntington, H.P., Gearheard, S., Mahoney, A.R., and Salomon, A.K. 2011. Integrating traditional and scientific knowledge through collaborative natural science field research: Identifying elements for success. Arctic 64(4):437–445.
https://doi.org/10.14430/arctic4143

IARPC (Interagency Arctic Research Policy Committee). 2018. Principles for conducting research in the Arctic. Washington, D.C.: IARPC, National Science Foundation.
https://www.iarpccollaborations.org/uploads/cms/documents/principles_for_conducting_research_in_the_arctic_final_2018.pdf

IPCC (Intergovernmental Panel on Climate Change). 2014. Summary for policymakers. In: Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., et al., eds. Climate Change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press. 1–32.

Israel, B.A., Schulz, A.J., Parker, E.A., and Becker, A.B. 2008. Critical issues in developing and following community-based participatory research principles. In: Minkler, M., and Wallerstein, N., eds. Community-based participatory research for health. San Francisco, California: Jossey-Bass. 47–62.

ITK and NRI (Inuit Tapiriit Kanatami and Nunavut Research Institute). 2007. Negotiating research relationships with Inuit communities: A guide for researchers. Edited by S. Nickels, J. Shirley, and G. Laidler. Ottawa: ITK and Iqaluit: NRI.

Johnson-Joseph, L., Kelso, L., and Marshall, L. 2006. Alaska Air medical escort training manual, 4th ed. Juneau: Alaska Department of Health and Social Services, Division of Public Health.

Kendrick, A. 2003. Caribou co-management in northern Canada: Fostering multiple ways of knowing. In: Berkes, F., Colding, J., and Folke, C., eds. Navigating social-ecological systems: Building resilience for complexity and change. Cambridge: Cambridge University Press. 241–267.

Knapp, M.L., and Hall, J.A. 2010. Nonverbal behavior in human communication, 7th ed. Boston: Wadsworth/Cengage Learning.

Konrath, S., and Grynberg, D. 2016. The positive (and negative) psychology of empathy. In: Watt, D.F., and Panksepp, J., eds. Psychology and neurobiology of empathy. Psychology of emotions, motivations and actions. Hauppauge, New York: Nova Biomedical Books. 63–107.

Mahoney, A., Gearheard, S., Oshima, T., and Qillaq, T. 2009. Sea ice thickness measurements from a community-based observing network. Bulletin of the American Meteorological Society 90(3):370–377.
https://doi.org/10.1175/2008BAMS2696.1

McAllister, D.J. 1995. Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. Academy of Management Journal 38(1):24–59.

Mehrabian, A. 1972. Nonverbal communication. New Brunswick, New Jersey: Transaction Publishers.

Memon, A., Meissner, C.A., and Fraser, J. 2010. The cognitive interview: A meta-analytic review and study space analysis of the past 25 years. Psychology, Public Policy, and Law 16(4):340–372.
https://doi.org/10.1037/a0020518

Minkler, M. 2014. Enhancing data quality, relevance and use through community-based participatory research. In: Cytron, N., Pettit, K.L.S., Kingsley, G.T., Erickson, D.J., and Seidman, E.S., eds. What counts: Harnessing data for America's communities. San Francisco, California: Federal Reserve Bank of San Francisco and Urban Institute. 244–259.

Mishra, A.K. 1996. Organizational responses to crisis: The centrality of trust. In: Kramer, R.M., and Tyler, T.R., eds. Trust in organizations: Frontiers of theory and research. Thousand Oaks, California: Sage. 261–287.
https://doi.org/10.4135/9781452243610.n13

Noland, L.J., and Gallagher, T. 1989. Cross-cultural communication for land managers and planners in Alaska. Agroborealis 21(1):18–23.

NSF (National Science Foundation). 2004a. Guidelines for improved cooperation between Arctic researchers and northern communities. Arlington, Virginia: NSF.
https://archive.arcus.org/guidelines/Cooperation_draft_23August04.pdf

Pearce, T.D., Ford, J.D., Laidler, G.J., Smit, B., Duerden, F., Allarut, M., Andrachuk, M., et al. 2009. Community collaboration and climate change research in the Canadian Arctic. Polar Research 28(1):10–27.
https://doi.org/10.1111/j.1751-8369.2008.00094.x

Ratnasingam, P. 2003. Inter-organizational-trust in business-to-business e-commerce: A case study in customs clearance. Journal of Global Information Management 11(1):1–19.

Riess, H., and Kraft-Todd, G. 2014. E.M.P.A.T.H.Y.: A tool to enhance nonverbal communication between clinicians and their patients. Academic Medicine 89(8):1108–1112.
http://www.traininginpraktijk.nl/wp-content/uploads/2016/01/Empathy-belang-non-verbale-comm.pdf

Ring, P.S., and Van de Ven, A.H. 1992. Structuring cooperative relationships between organizations. Strategic Management Journal 13(7):483–498.

Sako, M. 1998. The information requirements of trust in supplier relations: Evidence from Japan, Europe and the United States. In: Lazaric, N., and Lorenz, E., eds. Trust and economic learning. Cheltenhan, United Kingdom: Edward Elgar. 23–47.

Samenow, J. 2011. Alaska storm brings epic wind, waves, coastal flooding and snow. Washington Post, 9 November.
https://www.washingtonpost.com/blogs/capital-weather-gang/post/alaska-storm-brings-epic-wind-waves-coastal-flooding-and-snow/2011/11/09/gIQA8gNb5M_blog.html

Scollon, R., and Scollon, S.B.K. 1980. Interethnic communication: How to recognize negative stereotypes and improve communication between ethnic groups. Fairbanks: Native Language Center, University of Alaska. 45 p.
http://www.alaskool.org/resources/teaching/ethnic/Interethnic_Comm.htm

Sicora, R.T. 2015. Personality and trust: A qualitative study on the personality styles/traits of leaders and employees and the impact on culture of trust within organizations. PhD dissertation, University of St. Thomas, Minnesota.
http://ir.stthomas.edu/caps_ed_orgdev_docdiss/43

Singer, T. 2006. The neuronal basis and ontogeny of empathy and mind reading: Review of literature and implications for future research. Neuroscience and Biobehavioral Reviews 30(6):863.
http://www.sfu.ca/~kathleea/docs/Neuroscience%20and%20Behavioural%20Review%202006%20Singer.pdf

Terenzi, J., Jorgenson, M.T., and Ely, C.R. 2014. Storm-surge flooding on the Yukon-Kuskokwim Delta, Alaska. Arctic 67(3):360–374.
https://doi.org/10.14430/arctic4403

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2017. UNESCO policy on engaging with Indigenous peoples (201 EX6).
unesdoc.unesco.org/images/0024/002477/247738e.pdf

Wiita, A. 2006. The culture of community-based research and a borderless North. Position paper presented at the 4th Northern Research Forum Open Meeting, 5–8 October, Oulu, Finland, and Luleå, Sweden.
https://www.rha.is/static/files/NRF/OpenAssemblies/Oulu2006/wiita_4th-nrf-pp.pdf

Wolcoff, M. 1987. Cross cultural communication. Anchorage: Association of Stranded Rural Alaskans in Anchorage.

Wolfe, B.B., Humphries, M.M., Pisaric, M.F.J., Balasubramaniam, A.M., Burn, C.R., Chan, L., Cooley, D., et al. 2011. Environmental change and traditional use of the Old Crow Flats in northern Canada: An IPY opportunity to meet the challenges of the new northern research paradigm. Arctic 64(1):127–135.
https://doi.org/10.14430/arctic4092

Zucker, L.G. 1986. Production of trust: Institutional sources of economic structure, 1840–1920. Research in Organizational Behavior 8:53–111.