

1 INTRODUCTION

This case study provides an example where traditional ecological knowledge (TEK) data were acquired appropriately, incorporated into analysis and decision-making processes, and used to engage the community in decision-making conversations.

For over 2,000 years, the Iñupiat and their ancestors have inhabited Point Hope, located within the Arctic Circle in Alaska's northwestern-most corner. With a population of approximately 711, Point Hope is the second largest municipality in Alaska's North Slope Borough (North Slope Borough 2017). Point Hope's position at the end of a spit pointing into the Chukchi Sea is ideal for land and sea hunting, especially for whales and walrus migrating along the coast. However, the town's exposure to waves, wind, and ice flows leaves it vulnerable to flooding and erosion, which has prompted community relocation in the past (North Slope Borough 2017). New challenges, including thawing permafrost and changing sea ice dynamics, are increasingly affecting the community and the surrounding ecosystem. Point Hope has overcome other challenges associated with exposure to the elements and isolation for many generations, creating rich traditional knowledge on how to adapt and build resilience. This case study seeks to apply this traditional knowledge to an engineering solution designed to mitigate the risks posed by climate change and enhance subsistence practices.

2 PROJECT BACKGROUND

TEK of adaptation and resilience provides the foundation to this project. Aqviq Environmental Services, LLC (AES), a subsidiary of the local Alaska Native Village corporation, Tikigaaq, has retained EA Engineering, Science, and Technology, Inc., PBC (EA), to support the National Fish and Wildlife Foundation project Traditions for the Future: Collaboratively Improving Coastal Resiliency in Point Hope, Alaska (Grant ID: 0318.19.070637). The project aims to create a prioritized inventory of potential shoreline adaptation and resilience strategies for Point Hope and develop preliminary designs for the community's highest priority needs. The work is funded by a grant from the 2019 National Coastal Resilience Fund, which was executed with the City of Point Hope in early 2021. Matching contributions have been provided primarily by local stakeholders and EA. The project also receives support from external partners, including the U.S. Army Corps of Engineers Research and Development Center and the Dredge Research Collaborative. The project focuses on the following four coastal resilience priorities identified from documents, including the 2017 Point Hope Comprehensive Plan, written through a collaboration of Point Hope residents, major landowners, public officials, government staff, the Alaska Native Tribal Health Consortium, and the North Slope Borough:

- **Repair and extension of the solitary 7-Mile Road:** This road is the community's only escape route to higher elevations and provides access to Point Hope's drinking water source and inland caribou and musk ox hunting (Figure 1). Although portions of this road reach 40–46 ft above sea level, lower elevations are susceptible to flood damage. In 2016, Point Hope prioritized funding road repair and extension. Road design has not begun, and resilient nature-based measures, such as a protective berm, are preferred but have not been evaluated. Under the funded grant, a preliminary site assessment will analyze areas of greatest risk and



Figure 1. Site vicinity

Source: EA Engineering, Science, and Technology, Inc.

identify strategies to ensure the road serves evacuation needs without compromising migratory bird habitat.

- **Ice cellar stability:** Within the past few years, at least six traditional ice cellars needed for storing meat acquired through subsistence hunting have failed or been lost to the sea (Figure 1). The loss of the ice cellars forces the population to replace the lost food through increased hunting and fishing or to rely on expensive, energy-intensive electrical walk-in freezers. Moreover, ice cellars impart a culturally important flavor to the meat. Ice cellar stability will be assessed along with potential erosion mitigation measures, such as barrier berms or increased vegetation.
- **Identifying strategies to slow erosion of culturally significant places:** Point Hope and the surrounding spit are rich with history, including the former village site and the Ipiutak National Historic Landmark (Figure 1). Thawing permafrost and reduced protection from shore-fast ice during fall storms are accelerating erosion in these areas.
- **Assessing installation of a boat ramp:** Safe boat access to open water is critical for subsistence hunting. Interviews with community members will help the project team define the needs and obstacles for a boat ramp.

The project team is pursuing the following goals related to the above priorities:

- Conduct outreach and stakeholder discussions, and invite feedback to potential project alternatives
- Collect site-specific data necessary to support project development
- Document highest risk areas for habitat loss
- Analyze and compare alternative strategies to address problems
- Prepare an alternatives analysis
- Prepare preliminary design and permit documentation for up to three selected projects
- Provide educational experiences for residents and students

3 STRATEGY FOR INCLUDING TRADITIONAL KNOWLEDGE

Although the City of Point Hope holds the grant, the project team does not include local residents or any member of the broader Iñupiat community, placing additional responsibility on the team to identify and ethically incorporate TEK. To facilitate cross-cultural communication, all project team and partner personnel visiting Point Hope were encouraged to participate in a cultural awareness and sensitivity class. Topics included differences in cultural communication styles and an introduction to the Iñupiat subsistence lifestyle. An additional meeting discussed Point Hope's history relating to Project Chariot, an attempt by the U.S. Atomic Energy Commission to create a port near Point Hope by excavating the sea floor with atomic bombs, and which included radioactive iodine experimentation on the local people (O'Neill 1994).

The project team adapted an ethical research protocol for respecting Iñupiaq values, history, and knowledge sovereignty, written by the Native Village of nearby Kotzebue (Whiting 2022). This guidance was incorporated into a community involvement plan (CIP), which describes the project team's goals to learn from and communicate project findings to the community (EA 2021). The CIP establishes that any publications arising from the research must acknowledge the intellectual property rights of community participants. Locations of cultural and sacred sites cannot be published without consent of both the Native Village and the City of Point Hope. The CIP also took inspiration from successful research projects conducted in the region, specifically Ikaaġvik Sikukuun, funded by the Gordon and Betty Moore Foundation. The CIP was provided to the City of Point Hope for feedback and approval before the first field event in July 2021.

Following the release of the CIP, the project team engaged with Point Hope residents in an iterative process, first communicating the project goals through a public meeting held during the week-long field event in July 2021. Public meeting participation was incentivized through food and a door prize for gasoline; community members were excited at the prospect of Subway sandwiches brought from Anchorage and a chance to offset some of Point Hope's high gas prices. The meeting emphasized that project objectives were built from the community's Comprehensive Plan and that projects will be brought only to the preliminary design stage. The meeting included both anonymous and in-person feedback to the project team through written notes and conversation. Before this field event, the project team studied academic literature and a variety of films, both formal documentaries and informal clips uploaded to YouTube, to better understand the community's needs and to avoid wasting time and burdening individuals with repeating basic information. This research familiarized the project team with traditional words, such as "siglauq" for "ice cellar," which replaced their English equivalent within project communications. Throughout the field event, the project team engaged with local knowledge holders according to their preference, through formal and informal interviews and site visits.

Data collection was largely qualitative; collected data consisted of photographs and interview video, transcripts, and notes. To help identify relevant information, images and data were labeled and sorted in digital folders by multiple attributes, including by project priority, by location, by project team member, by the holder (source) of TEK, and by date. Interviews and site visits were paid, and individuals were reimbursed for use of their personal vehicles. Formal interviews were recorded if individuals provided written consent. After the field event, a Facebook post to a prominent Point Hope Facebook group (Point Hope News) thanked the community for their participation and invited additional conversation. This systematic process of gathering information from the Point Hope community illustrates the concepts outlined in the Acquiring TEK and Managing TEK subtopic sheets.

TEK data acquired during the field event was recorded in interview transcripts, which were mined by the project team for relevant insights. These insights are being used in combination with baseline science and engineering data acquired during the field event to inform the alternatives analysis, in which the project team brainstorms possible engineering solutions to the four coastal resilience priorities. The project team will present the alternatives analysis to the City of Point Hope. The project team may also share these results with a graphic posted to the Point Hope News Facebook page. The project team will proceed with developing up to three engineering designs to address these problems, incorporating relevant feedback. At the end of the project in late 2022, the project team will post graphics illustrating any engineering designs to the Point Hope News Facebook page and will publish a YouTube video summarizing the project so the people of Point Hope can learn about the work and how their contributions were incorporated. This video will be discoverable by the general public, allowing others performing similar work to learn about the project.

4 CHALLENGES

Incorporating TEK is a fundamental aim of this work. However, the project has encountered challenges associated with this goal. Although it may coalesce around broad themes and is generally consistent, TEK is sometimes conflicting. The project

team identified types of individuals with different knowledge sets in the CIP. During the alternatives analysis, in the event of conflicting information, greater weight is placed on hunters' firsthand knowledge in determining which alternatives to pursue. Despite some information that erosion occurs from both currents and storm events, an elder, former hunter explained that the coastal erosion is periodic, mainly occurring after fall storms now that the protective shore-fast ice forms later in the season (Oomittuk 2021). This information led the project team to consider temporary, removable shore armoring during the alternatives analysis discussion on the coastal erosion problem.

In some cases, information provided by hunters may indicate a need for collection of a different data set. For example, in response to questions about ice cellar placement, a hunter explained that ice cellars must be built in areas with small soil grain size and that most of the spit is unsuitable gravel, revealing a need to obtain a grain-size analysis for soil in the ice cellar area (Lane 2021).

Despite the emphasis on TEK obtained from hunters, conflicting information received from other individuals must still be considered. Should the project not use information provided by an individual or category of knowledge holder, these individuals may feel ignored. Additional complexity arises from subtly conflicting information provided by active hunters on topics such as proper ice cellar maintenance.

Although the project team prioritizes hunters' knowledge, they are least likely to formally participate. Hunters often have unpredictable schedules; the sudden appearance of game may require them to leave for hunting trips without notice, making scheduling meetings difficult. Hunters have tended to prefer informal interviews, which do not present the same opportunities for detailed notetaking and recording available in a formal setting; review of exact context and wording is impossible. Notes from informal meetings are susceptible to the biases and knowledge of the interviewer, who may not understand the Iñupiaq words used in everyday conversation in Point Hope.

A final challenge encountered in incorporating TEK is minimizing the burden on participating individuals. Point Hope is a small community; the same half dozen or so people tend to repeatedly engage in outside efforts to assist the community and address other needs, such as the COVID-19 response, and maintain city and tribal institutions. Although many outside efforts are initiated through an honest desire to help, they are not always successful, leading to fatigue and frustration in the local participants, which may temper their enthusiasm to participate in the current effort despite monetary compensation.

5 BENEFITS OF TRADITIONAL KNOWLEDGE TO THE PROJECT TO DATE

Although still in its initial stages, the project has already benefited from TEK. Initial solutions entertained by the project team, like new ice cellar construction in a different area, have already been unsuccessfully tried; such community experimentation will help the project team avoid proposing redundant ideas as potential solutions to the four coastal resiliency priorities. Although the project team attempted to read the literature relevant to Point Hope's needs before visiting, an important ice cellar pilot study in Kaktovik (on Alaska's north slope) was brought to the team's attention by a community member. This study may provide important insight for designing an engineering solution to keep ice cellars cold despite melting permafrost. Finally, a hunter (Lane 2021) proposed a removable boat ramp, a concept that could fit the seasonal needs of the community and allow the ramp to be moved should the community relocate. These solutions provide examples of the principles described in the Using and Consuming TEK subtopic sheet.

6 REFERENCES AND ACRONYMS

The references cited in this fact sheet, and the other ITRC EDM Best Practices fact sheets, are included in one combined list that is available on the ITRC web site. The combined acronyms list is also available on the ITRC web site.