Oceanographic solutions to human-induced environmental threats to seafood security in Southeast Alaska

The Southeast Alaska ocean environment is rapidly changing. Diminished stability of ocean ecosystems can negatively impact local and indigenous communities that depend on these systems for sustenance and economic livelihood. Large-scale climate changes and human impacts including receding glaciers, the warming of the ocean, lowering of seawater pH and oxygen (O_2), and anthropogenic pollution are disrupting nearshore ecosystems. At smaller spatiotemporal scales, activities such as mining, fishing pressure, and the expansion of predator species and predator prey-switching are also disrupting ecosystem stability. Native Alaskan communities immediately feel these negative impacts and often are aware when they are about to occur, but can in many cases may have limited resources to advocate for change. Indigenous-directed oceanography that invokes a partnership of community leaders and oceanographers, may serve as a tool to accelerate the discovery of solutions to these changes and empower members of the community to lead the way in preventing future negative impacts.

The University of Alaska Southeast (UAS) and University of Washington (UW), propose to develop a virtual community oceanography knowledge working group center, where community leaders and oceanographers are equal partners. This group will 1) work together with indigenous and local leadership that have identified a negative impact to their community and that could be served through a community oceanography approach, 2) develop a holistic approach where community members are an integral and equal partner during the scientific planning process 3) create an Indigenous relevant-based science undergraduate course that blends indigenous and traditional scientific knowledge, and 4) write a follow-up proposal to Alaska Sea Grant to continue to build upon the established holistic scientific approach. The working group proposes to primarily work with the indigenous community near Angoon, Alaska. Angoon residents have been negatively impacted by an increase in anthropogenic metal pollution, including potentially high levels of mercury. These contaminants negatively impact traditional food sources, such as seals, and have been recorded to have the highest concentrations of mercury in the state despite advocacy for change.

The proposed working group will work together with local Angoon community members and scientists to identify the major environmental impact to their community, and develop a concrete plan to address this issue by incorporating established Indigenous ecosystem knowledge with oceanographic approaches. The undergraduate course will allow younger members of the community to gain education in both knowledge bases as part of a university educational setting. A unique learning outcome of this course would be that students would gain a depth of understanding and appreciation for Indigenous and local communities impacted by ecosystem disruption, while synergistically developing their quantitative skill sets in oceanography. We believe that this approach will empower students with the tool sets to better understand new and unanticipated environmental challenges, and will help train future local community and oceanographic leaders. With an inclusive set of tools, students can use their Indigenous and oceanographic knowledge skill sets to benefit communities in their study areas and publish and benefit the scientific community at large.

Part of the reason that the field of oceanography lacks diversity is that oceanographers have historically overlooked the people living on shorelines of the oceans they study. In Southeast Alaska, we are changing that through engagement, regular communication with the community,

and a partnership of oceanographers with Indigenous leaders at the start of the research. Communities are better adapted to environmental change when they are provided with resources. Young community leaders are often inspired by tangible work that betters their communities and that they can see for themselves. Through our proposal working group, we aim to work with the communities of Southeast Alaska towards local environmental solutions. Our hope is to inspire, engage, and empower the community youth and to pique their interest into the field of oceanography through the community work we do in our partnership. Through this partnership we hope to produce solutions towards oceanographic challenges affecting community sustenance and livelihood, as well as to change the face of the next generation of oceanographers to include indigenous and local communities of Alaska.