

Monitoring Beach Erosion at Hooper Bay, Alaska

Global climate change is in the news. It is argued in economic circles and in Congress. As storm surges increasingly assault the coastal communities along Alaska's western coastline with the Bering Sea, climate change has a different meaning. As water rises and flooding in villages like Newtok, Shishmarf, and Hooper Bay occurs, people in these villages worry. Newtok and Shishmarf must move their entire village to more protected areas at the cost of millions of dollars. Hooper Bay may be next on this growing list of vagabond communities.



Global climate change alters weather patterns and, as a result, the conditions that lead to flooding become more common. A combination of normal tidal cycles and changing weather patterns builds up water along the eastern shore of the Bering Sea and may lead to flooding. For instance, one storm with wind driven water produced a water level over 6 feet above the normal tidal height. Normally we know this as a hurricane or tropical storm along the coastlines of Florida, and leads to images of flooding, homes submerged in water, and people rescued in small boats. In Alaska, the same processes are hidden in the news. Alaska has its own hurricanes but they don't have dramatic names like Bob or Bill, they are merely called "Low Pressure Centers".



During the September 25, 2005 storm surge event, the waters rose, surged across a wide span of tundra, and crossed the main road connecting old town of Hooper Bay with the central part of town. Another surge cut the main road on the way to the airport, closing communications with the outside world. The flooding forced a number of families to vacate their homes and food supplies were delayed for about seven days.

Purdue University is directly involved in protecting Hooper Bay. The School of Civil Engineering and the Center for the Environment are on the beaches measuring, assessing, and training the Native people of Paimiut and Hooper Bay to monitor changes in their environment and changes in the protective barrier protecting Hooper Bay. Dr. Steven Johnson (Civil Engineering-Purdue) recently traveled to Hooper Bay to work with Dr. Michael Smolen (Center for the Environment-Purdue) to establish a Native run program to monitor the seasonal and annual processes involved with beach modification along Hooper Bay.

A storm may lead to temporary flooding in Hooper Bay, but the greatest effect may be a hidden change that affects the primary protective barrier that separates the ocean from the people of Hooper Bay. Nuok Spit protects Hooper Bay from storms. As hurricanes cross the Aleutian Islands and move into the Bering Sea and travel to the Arctic, the winds and waves crash on this protective spit at Hooper Bay. As a result of this assault, sand is moved, beaches are modified, and the spit is eroded.

Drs. Smolen and Johnson have taken the lead to help the village address this problem. They traveled to Hooper Bay and led a program to establish a monitoring program that involved Native people. Dr. Johnson trained local environmental specialists in the use of surveying tools and methods to record how beaches change during the year and to measure the effects of the catastrophic effects of storms. Dr. Smolen provided training in measuring related variables in the beach erosion environment. As the Native people make the observations, Drs. Smolen and Johnson will assist them with presenting and analyzing the results.



Dr. Johnson demonstrates how to set up a theodolite.



"Stretch that tape" is taught to future Native Surveyors.

Today, there is a cadre of Native Survey villagers who are learning surveying skills to monitor their environment. With the guidance and direction of Drs. Smolen and Johnson, the village is measuring erosion, developing new topographic maps to predict flood risk levels, accessing elevations for habitat management, and, most importantly, developing the means to collaborate with Purdue to inject rigorous science research into the day-to-day life in an isolated, rural Alaskan village.



An automatic level provides the data needed to measure the changes in beach slope.



Checking data is critical to accurate measurement.



The Hooper Bay Surveyors and their friend.