Climate Change Adaptation for an At-Risk Community: Shaktoolik, Alaska

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Traditional Inupiaq village of 250 people
Shaktoolik lies near the north end of a narrow gravel and sand spit, 13 miles from high ground.
One street, \( \frac{3}{4} \) mile long, with row of houses on each side.
It is separated from the sea by a narrow beach and from the mainland by the Tagoomenik River.
Moved to current site in 1975 from old village a mile south.
In the fall the river and lagoon freeze over...

And slushy or broken ice forms along the shore on the seaward side. This band of broken ice breaks the big storm waves, if it is in place.
In winter Norton Sound freezes over.
Like many W and N Alaska communities it’s experiencing changes resulting from a warming climate.
In Shaktoolik the greatest climate-related concern is the later freeze up of sea and shore ice.

Fall storm waves to build up higher and hit with more force, and without ice the beach is more susceptible to erosion.
Recent storms have flung drift logs almost into peoples’ homes, damaged sewage leach fields and nearly undercut bulk fuel tanks.

If a storm surge temporarily raises sea level only a few more feet, this could be a deadly situation.
Recent decades storms have not been nearly as severe as what people there know is possible, and what models predict.

In a really severe storm with high storm surge the sea could sweep through the village.
People know it’s only a matter of time.
Why Did the Sea Grant Marine Advisory Program get involved?

We’re fish people

Thirty years ago I had a herring fishing operation in Norton Sound.

But...

We realized else that climate change was going to have big affects on Alaska. Responses at the time were:

• Research and monitoring
• Mitigation (working to reduce green-house gas emissions)

We said, “What can people do to adapt to the changes that are not only inevitable in the future but are already occurring?”
Living on Alaska’s Changing Coast:
Adapting to Climate Change in Coastal Alaska

Located Alaska’s changing before our eyes. Some changes are dramatic, others subtle. Some are rapid and others gradual. But there is no question that our coast and our marine-dependent communities are undergoing profound changes, much of it related to temperatures, weather, and climate. People who live and work here and the idea of experiencing many of these changes at a disturbing rate.

Scientists who study the ocean and coastal seas indicate that they are changing between now and the end of this century. Some of the predicted changes will be harmful to coastal residents; some will be beneficial. Helpful observations can mean the difference to our communities, businesses, and fisheries. In some cases, we may need to transition from these.

How do we adapt?

We must adapt to these changes. As a species, we have adapted to many kinds of change—environmental, social, economic, and technological—throughout our history. We have adapted by developing technology as a means to change. In Alaska, we have adapted to higher grounds as a result of adaptation and building, and construction of dikes and pulling buildings on piles.

Adaptation requires change. We need to use climate adaptation and planning in the anticipation and distribution of benefits to maximize our potential. We need the scientific thinking in thoughtful adaptation planning.

Recent Alaska Adaptation

The Alaska coastal village of Shaktatse’s focus on change: threats of erosion and flooding, climate change, and green energy. A community is adapting to change and planning for the future. Shaktatse is working on a comprehensive adaptation plan that includes a comprehensive adaptation plan.

How we can help

Take a look at the adaptation tools, fact sheets, and videos on these pages. Let us know if you have a question or would like us to meet with you. Contact us at 907-274-1650.

Fact Sheets

- Alaska’s Changing Coast: Cohesive Climate Change
- Antarctic Ocean
- Arctic Alaska
- Arctic Alaska’s Changing Climate
- Arctic Science
- Arctic Science
- Antarctic Ocean
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Climate Change Adaptation Planning Manual
For Coastal Alaskans and Marine-Dependent Communities

Alaska Sea Grant Marine Advisory Program
University of Alaska Fairbanks
2011

Terry Johnson
In 2012 Alaska Sea Grant got funding from National Sea Grant intended to help communities address climate related problems.

Glenn Gray, an independent consultant, had been working with Shaktoolik and other Bering Sea coastal villages. Sea Grant saw an opportunity to partner and build on what he and the community had already done.
We held meetings with a six-member planning committee. Meetings were open to the public and other residents participated.
With Sea Grant funding, the village (tribe) hired Thomas Sagoonik as project coordinator
Planning committee members voiced several concerns:

Breach of the spit
- Damage/loss of tank farm
- Water supply
Coastal (beach and bluff) erosion is concern of many residents. (The old village was threatened by coastal erosion.)
But greatest was threat of inundation during a fall storm. They lacked a plan for protecting their homes, and the lives of their children and grandchildren.
We visited Shaktoolik during different seasons of the year, studied locations.

**Sally Cox** of DCRA, and DOT engineers **Harvey Smith** and **Ruth Carter**, had worked in Shaktoolik before, conducted a joint visit with us, and plan future work there.

During each visit we held a public meeting.
We conducted extensive review of existing studies and made inquiries of our own.

We consulted with experts at:
Army Corps of Engineers
University of Alaska
AK Division of Geol and Geoph Survey
AK Dept of Community & Reg. Affairs
Dept. Homeland Security & Em Mgt.
Dept. of Transportation and Pub. Fac.
We discussed a full range of options with the community, including:
Relocation and co-location
Evacuation road
Evacuation shelter...

Evacuation road deemed too impractical and expensive.

The first decision they announced to us was their intent to “stay and defend”
The community had previously commissioned study of a multi-purpose/evacuation building. Projected cost was $10 million and climbing.
We discussed measures to combat erosion such as “hardening” shorelines – breakwaters, riprap, gabions, etc.

We researched “floodproofing” homes by elevating them above potential flood waters with Triodetic foundations.
Meanwhile, Shaktoolik got funding to expand and reinforce the school and add a multipurpose room. Designed to withstand battering by the sea, but it’s neither high enough or large enough to protect all residents.
What was needed:
1. Protection of life in worst-case storm
2. Protection of property from flooding
3. Protection from erosion, if identified.

Solutions ideally would be:
Relatively low cost
Technically simple
Done with local labor and materials.
DOT engineers proposed a vegetated berm on the sea side of the village.

Courtesy Harvey Smith
Alaska DOT
A storm surge mound could be pattern aier this tsunami mound that survived the Japan tsunami.

Criteria for Storm Surge Mound

- Quick SAFE access during storm conditions
- Above 500 year storm surge flood elevation
- Provides shelter and is close to the community
- Has multiple uses such as Community Center
- Set back from coast

Engineering Concept and Rendering by Harvey N. Smith, PE, Statewide Coastal Engineer, DOT&PF 2011
Shaktoolik, Alaska: Climate Change Adaptation for an At-Risk Community
Alaska Sea Grant Program

Adaptation Measures
Prepared by: Terry Johnson, Alaska Sea Grant Program &
Glenn Gray, Glenn Gray and Associates
For: The Community of Shaktoolik
November 4, 2013

Sources for Climate Change
Adaptation Funding and
Technical Assistance
The Planning Committee held a meeting in November 2013 which produced a lot of good discussion but no decisions.

The committee met again in December and came to consensus on nine action measures.
2011 storm

2013 storm
Shaktoolik’s Nine Initiatives

1. Build a vegetated berm
2. Build a storm surge mound
3. Seek funding for a multipurpose building/shelter
4. Start seeking funding for the other measures
5. Update the local hazard mitigation plan
6. Explore options to replace/relocate tank farms
7. Implement a community monitoring system
8. Pursue funding and guidance for future studies
9. Develop local guidelines (non-binding zoning) to make future development as safe as possible.
In January we presented the plan draft at a community meeting attended by 40% of Shaktoolik’s entire population.
Subsequently, Mayor Asicksik got grants from NSCDC totaling $620k.

(Also >$1 million for repairs to leach fields, beach access, from FEMA after 2013 storm.)

Bought two army surplus dump trucks.
Rented one truck, one tractor and purchased fuel from the city.

Arranged purchase of gravel at mouth of Shaktoolik River from Corporation.
Hired 4-8 laborers @ $20/hr and 8 operators @ $23/hr.

Berm is local gravel over driftwood, to be topped by sod for vegetative cover.

Construction is nearing completion.
Using consolidated regional (NSCDC) funding, he bought machinery, secured rights to materials, hired local workers, and has nearly completed construction of a 5’ high berm on the seaward side of the village.

“The community said ‘stay and defend’ and that’s what I’m trying to do – defend the community” – Mayor Eugene Asicksik

The IRA is considering building an evacuation mound in the future. Need to identify source of funds.
What’s next?

The “Sea Grant Project” is done. The community agreed on a set of measures.

The Alaska Community Coastal Protection Project is about to commence. Purpose is to enhance community sustainability and resilience. RFP just out.

DCRA will hire and train a full-time Community Coordinator. Will organize an interagency working group to coordinate resources and technical assistance.

Will develop a Comprehensive Strategic Management Plan for next 5-10 years.
Shaktoolik’s working principles:

- Low-cost measures most likely to get funded
- Low-tech measures most likely to be successful
- Use local labor, talent, and materials.
- Take the initiative, don’t wait for government to do it.

“We are doing something. I tell them, let’s make a start and maybe we’ll get some help.” – Mayor Asicksik
Lessons I learned:
• Actual problems may not fit the planning template.
• An “adaptation plan” has many meanings, many levels of development.
• It helps a lot if people already know that the main problem is.
• Multiple, open, discussions air all the potential solutions.
• It’s very good if the entities get along and work well together.
• People are tired of being studied, skeptical of more consultants.
• People doubt big state/federal infrastructure grants are coming soon, if at all.
• While broad agreement is necessary, a few individuals make it all happen.
• Sometimes you have to just insist that people make decisions.
Thanks for attending.

Questions or comments?

http://seagrant.uaf.edu/map/climate/index/php

http://seagrant.uaf.edu/map/climate/shaktoolik.index.php

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