Arctic Community-Based Environmental Monitoring, Observation and Information Stations Phase I: Bering Sea Sub-Network

Project number: FP 247

Update (2010):

Report on Preliminary Results of the Bering Sea Sub Network (Pilot Phase)

Lilian Alessa, Victoria Gofman, Andy Kliskey

The Bering Sea Sub-Network: International Community-Based Environmental Observation Alliance for the Arctic Observing Network, known as BSSN, is a 2008-09 International Polar Year project implemented by the Aleut International Association in collaboration with the University of Alaska, United Nations Environment Programme – Global Resource Databank Arendal and the Alaska Native Science Commission under the auspices of the Conservation of Arctic Flora and Fauna working group of the Arctic Council. BSSN is funded by the United States National Science Foundation. The project began as a pilot in 2007 and received an award for a five-year continuation in 2009.

BSSN is a network of coastal communities. It began from six villages representing six indigenous cultures: three in the Russian Federation (Kanchalan — Chukchi, Tymlat — Koryak, and Nikolskoye – Western Aleut/Unangas) and three in the United Stated (Gambell – St. Lawrence Island Yupik, Togiak — Central Yu'pik, and Sand Point— Eastern Aleut/Unangan). In the next five years four more Alaskan villages will be able to join the network. This project creates a structured framework that provides the means for the systematic collection of information about the environment and lays a foundation for future community-based research. The network also provides for the efficient management of data gathered from community-based environmental observations.

The overall goal of the Bering Sea Sub Network (BSSN) is to improve knowledge of the environmental changes that are of significance to understanding pan-arctic processes, and to enable scientists, arctic communities and governments to predict, plan and respond to these changes.

BSSN's objective is to develop a framework to enable residents in remote Arctic communities to systematically document physical and social changes occurring in their region. This may enhance community resilience under conditions of rapid environmental and social change. BSSN has emerged as an observing network that connects people bound by a common geographic area who share similar traditions, values, and ideals.

Project progress

The first project year (June 2007 – May 2008) was taken up with extensive travel, meetings with the individuals and communities involved in BSSN, efforts to establish and formalize international partnerships, and the development of the survey instrument. The survey instrument was designed utilizing sociological methods, drawing in particular on cognitive interviewing techniques. In addition, the BSSN team developed a uniform protocol for interviewing residents in all participating villages about their observations of environmental conditions and marine resources.

In the second project year (June 2008 – August 2009), the expanded BSSN team which grew to approximately 20 researchers, coordinators, and assistants was busy interviewing hunters and fishermen and processing the collected data. Despite extensive preparation work, not all nuances of working in remote villages could have been predicted, and a fair amount of trouble shooting was required. In some villages, additional training of newly hired research assistants was arranged, in others – project management needed adjustments. These issues were resolved successfully thanks to great assistance from BSSN villages' leaders and regional partners. Over 600 interviews were conducted in six villages. Approximately 300 hunters and fishermen participated. Although the analyzed sample size is smaller due to a number of surveys not meeting quality control standards, as was expected in the pilot phase, the research yielded interesting findings.

Survey results summary examples

Demographic makeup of survey participants

The BSSN community in this survey is represented by 246 people. The gender of participants is balanced with 65.3 percent male and 34.7 percent female. The majority have lived in the area for more than 30 years (70.5 %). 42.5 percent have also harvested in the same area for more than 30 years. Thus the majority of participants have accumulated several decades of observations of the local environment.

Composition of sampled species

The species harvested by survey participants are important for subsistence in many Bering Sea villages. Many of them, such as pink salmon, are also important commercial species. An increasing competition for such species, coupled with environmental changes driven by human activities and other changes in natural and physical environment, can amplify deficiencies in regulatory policies, and thus have a negative impact on communities that depend on the marine biological resources for their wellbeing and often survival. The survey participants showed a great concern for the health of the Sea and the fish and they shared their observations in great detail. One person concluded, "The Sea is sick and the fish are sick too."

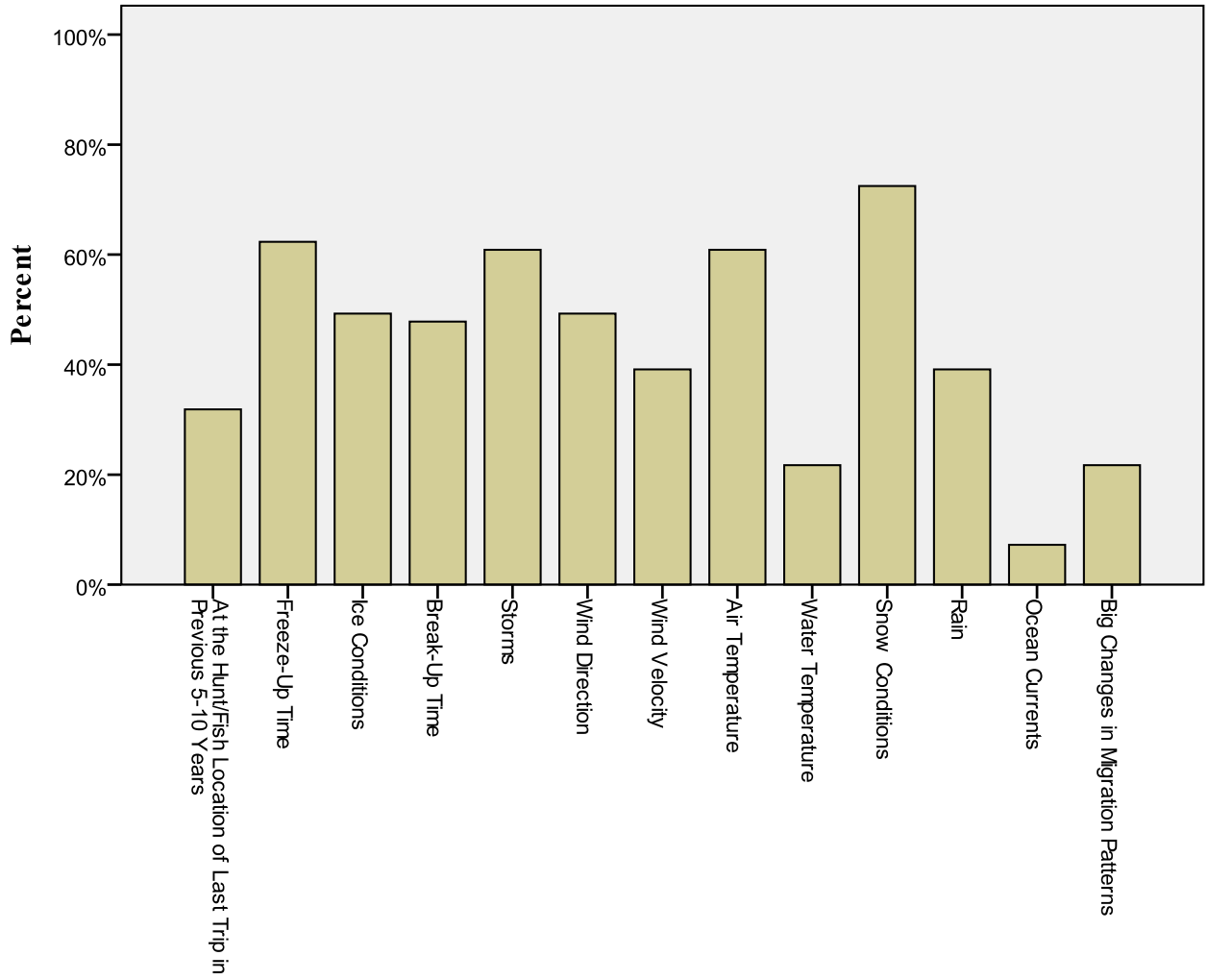
Animals caught with disease

While every community reported the presence of normally expected fish abnormalities such as bite marks from marine mammals and injuries from nets and trawlers, there were an array of more unusual diseases and abnormalities along with suggested explanations reported as well. For instance; two people described their catches as being "boiled-like", with one noting, "The fish were boiled-liked, and inside there was something like a bruise, the organs were like glue. Some of the fish didn't have fins, and some lacked noses".

Observed environmental changes

The graphs below are summaies of the frequencies of the observed environmental changes in two of the six BSSN communities. Each graph is followed by more details on the most significant changes for that community. The quantitative data is accompanied by descriptions of the observed changes by the respondents.

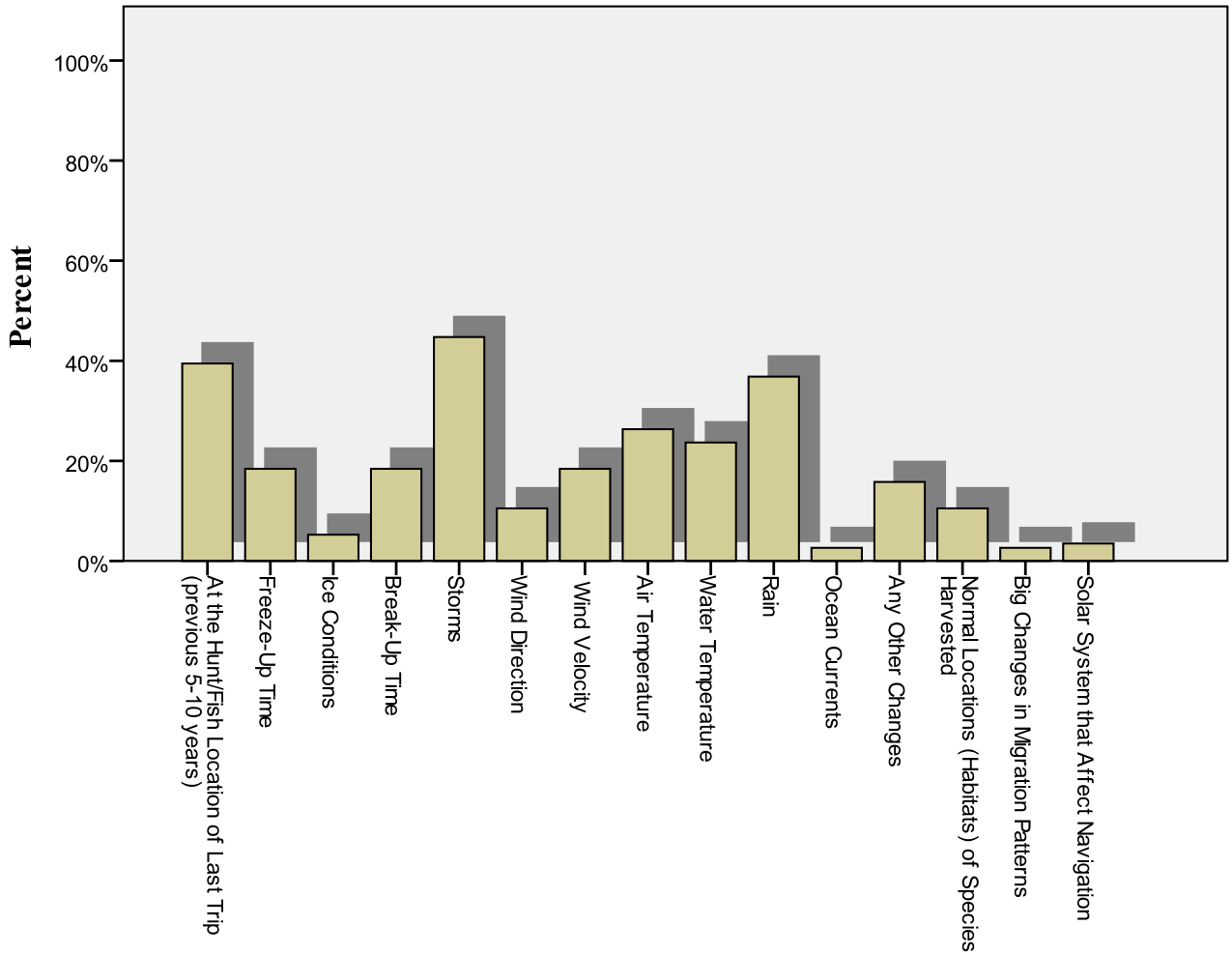
Graph 1. Respondent Noticed Changes Over the Last 10-25 Years (unless otherwise specified) In Togiak (n=69)



- **Snow conditions** (73%), changes included:
  - Less snow (38%)
  - More snow (12%)
    - 50% of those who observed more snow made it clear that they were talking about this year, in comparison to prior years. Thus, they might agree with the more common observation of less snow.
  - Late arrival of snowfall (7%) [possibly linked to increased rain, see below]
  - Fluffy/powdery snow
  - Wet snow, particularly in December and January
  - Rapid disappearance snow due to early melting or wind blowing away
  - Comments:
    - "Long ago there was lots of snow, and when it got cold it stayed cold. We used to dig up doors below. Our homes used to be covered and it was good insulation for our home. Now winters come late."
    - "Long time ago there used to be lots of snow and blizzards."
    - "Less snow and it's powder; it blows away."
    - "Snow comes very late in November or December, and there's less snow."

- **Freeze-up time** (62%), changes include:
  - Late (25%)
  - Annual variation in freeze-up time (16%)
  - Early (7%)
  - Comments:
    - "It freezes later. Our weather is getting worse. The North is going towards the East three inches a year. When North reaches Southeast there will be no more winters."
    - "Later arrival of the ice. After freeze-up it warms up again and melts, and then it freezes up again. It is very warm now."
    - "Freeze up of the bay and river took longer than expected. And it has even rained in December, making it harder to travel with snow machine."
    - "Freezes-up very early some years, very late the next year. Freeze up is not constant anymore."
    - "The weather is different each year. Sometimes it freezes early and sometimes it doesn't."

Graph 2. Respondents Noticed Changes at Some Point Over the last 10-25 Years (unless otherwise specified) In Tymlat (n=38)



- **Storms,** reported changes, indicating an overall worsening of weather, include:
    - Increased frequency (26%)
    - Increasing strength (13%)
    - Hail (18%), which didn't generally happen before
    - Storms and cyclones brought on winds from the east
    - More thunderstorms
    - Comments:
        - "In the past two years, 2007 and 2008, there have been more storms than in previous years. "Now the storms are very strong, the water has risen 1.5-2 meters."
        - "Since 2005 there's started to be more storms. And they are stronger and bigger with every year. And there are winds and rains"
        - "This year there were a lot of storms. We stayed at home for weeks. There was nothing like this before."
        - "The weather is bad more often now, overcast. More storms. We used to come to Tymlat - summers were dry, warm. It used to be hotter, drier compared to the last 3-5 years."
        - "This year there was hail. It was very large. I've never seen hail during the summer. I saw it from the balcony. It was at 2pm. The first time it went on for about 10 minutes. And then at 3pm it went on for 20 minutes, hailing more and covering the entire ground."
        - "There are more thunderstorms this year, we even had hail. Two years back we did not have such things"
        - "In Summer 2008 – in July – for the first time, large hail fell."
        - "In 2001 in the fall there was a big storm, big waves. It flooded the fish-processing plant; it took plastic kitchenware from the plant. After the storm there were cod along the shore. We collected them for the dogs."
- **Rain and precipitation**, reported changes include:
    - More rain (45%)
        - Summer (16%)
        - Winter (mixed rain and snow)
        - No one reported less rain
        - Comments:
            - "The rain poured almost the whole summer, even in December there was rain mixed with snow at night. In the day time, frost and glazed frost. There was no such thing before."
            - "In December of this year, at the beginning, there were brief rain showers at night. This has not been observed in the past. And there's pouring rain in the summer."
            - "There was pouring rain all summer, autumn, up to December. Big deluge of water."
- **Flooding** as a result of storms and rain
    - Comments:
        - "One time in October 2008 there was a strong storm. Violent wind, the river overflowed, began to flood the lower homes, two river channels emerged."
        - "There was a flood. The water even came up to our house, 400 meters from the bank. It rose 1.5 meters. The river came over the banks. This is the second time this has happened here. The first time [it happened] was 30 years ago."

        - “This year there was heavy flooding, the water rose a lot”
- **Snow**, reported changes include:
    - More snow (26%)
    - Less snow (11%)
    - Comments:
        - “Snow falls late, close to December and anyway very little. But a lot of snow in spring.”
        - “It used to be, 10 years ago, that there was no snow until December. Only freeze-ups but no snow. Now with every year there is more and more snow. In June there is lots of snow still.”
        - “This year Easterlies brought a lot of snow. Last year there was less. This year the porch was covered with a lot of snow.”
        - “This year after a week-long blizzard there was a lot of snow in January, up to 11th floor. We went outside to go to work and were surprised to see huge snow banks. We crawled at times. It has been a long time since we had so much snow.”
- **Air temperature**, while only a small percentage of the sample reported changes (26%), respondents open-ended comments included observations of:
    - Colder (34%)
        - Summer (13%)
        - Fall
    - Warmer (13%)
        - Winter
    - Comments:
        - “It is much colder now compared to the previous 3-5 years. It used to be very hot. Now you have to dress warmly to go berry picking.”
        - “It is always cold, cool. This year is especially cold, nothing grew in greenhouses. No sun.”
        - “It is getting colder at Pilyuna faster. Snow falls earlier up to 1-1.5cm Mostly it is blown away by the winds. In spring it melts there faster. In mid-May there is no snow]”
        - “Yes, it was stormy. A cold summer. Every year summer is cold. Because of the storms we fish little. Before, 10 years ago it was warmer, even hotter.”
        - “A cold summer. No warmth. It’s been a few cold years in a row like this. But winter is warm, no more freezing temperatures like before.”
        - “The winter has gotten warmer, probably because of global warming, there is less snow. It was warm at home. Before we used to sit in the kitchen by the oven to warm ourselves up. But now we sleep in the rooms.”
        - “I went fishing on December 19. There was drizzling rain. It’s a very warm winter. It was never like this in the past.”

In general, data for all six BSSN communities show that clear trends across all markers of climate change do not appear to be consistent throughout the region, but instead there is a very clear voice of increasing variability. Understanding this variability is very important because this understanding could help communities plan for future action and could ensure that mitigation and adaptation plans do not address the wrong issues or generic issues that a particular community may not have.

Lessons Learned

1. Utilizing emerging communication tools is essential

Despite the distances between the Principle Investigators and member communities, extensive communications were possible due to the use of digital tools, such as Skype, to supplement scheduled teleconferences where possible. These tools allow real time audio and visual interactions on a daily basis and enable a distributed, coordinated network to function smoothly and acquire systematic data, reliably. The use of emergent communication and data acquisition tools will be further applied in BSSN to build on the growing momentum of community collaboration that was developed in the Pilot Phase.

2. Training and Face to Face Meetings for Community Coordinators are Essential

The training period for community coordinators needs to be extended in order to better equip them to independently cope with the variability inherent in the respondents. On-site training in each community proved to be more efficient than training at a seminar in a central location, such as Anchorage. This could help minimize the amount of oversight and physical presence required by the Principle Investigators in the communities.

3. It is possible to reduce 'filtering' by respondents

One of the significant accomplishments of the survey question design, which occurred through extensive discussions between the communities and researchers, was in the reduction of "filtering" by respondents. This can be achieved by focusing on actual events and individual life experiences while extracting information on various physical and natural phenomena. Special attention was paid to avoiding "driving" respondents to any "well-known" facts or media-publicized conclusions. This approach increases objectivity in respect to assessments based on the observations of local residents. Of equal importance is the improvement of data accuracy as questionnaire entries are entered in their original languages, English and Russian.

4. Brief examples of data use, for both science and stakeholders needs

- Preliminary Pilot Phase data from BSSN provide insight to the constraints on adaptation: individuals in Alaskan communities are far more mobile than those in Russian communities, through freedom and means (i.e., fuel) to move, leading to greater options to respond to change in the former – particularly those affecting local scales.

- Residents of Kanchalan overwhelmingly were pointing to the changes in the river and some raised concerns about mining activities in the area. Another often mentioned observation was an increase in pike population. A local scientist suggested an increased acidity in the river as a possible cause of changes in fish population and health.

Conclusions

The survey results are in the process of analysis and it is too early to make broad conclusions. The number of responses in the pilot has been relatively small so one should be careful drawing too many conclusions. The data summaries presented in this documents point to a number of questions.

- What are potential sources affecting species?
- How can clear recommendations be made about what can be mitigated and what would require communities to adapt?
- How can observations from different sources be used to understand possible routes of mitigation versus adaptation?

BSSN research team will pay special attention to these issues in BSSN II.

Fit with broader suite of international Arctic observing efforts

BSSN contributes to the US Arctic Observing Network which is an integral part of the SEARCH program to improve observational capabilities in the Arctic and leave a long-term legacy for the benefit of science and society. BSSN is an IPY (International Polar Year) project and contributes to the goal of engaging northern residents as full partners in the research taking place in their own locales. BSSN data will increase knowledge and understanding of the regional causes and consequences of rapid arctic change, provide insight into the consequences of change to local communities in the Bering Sea region, and assist in the development of adaptive responses to arctic change.

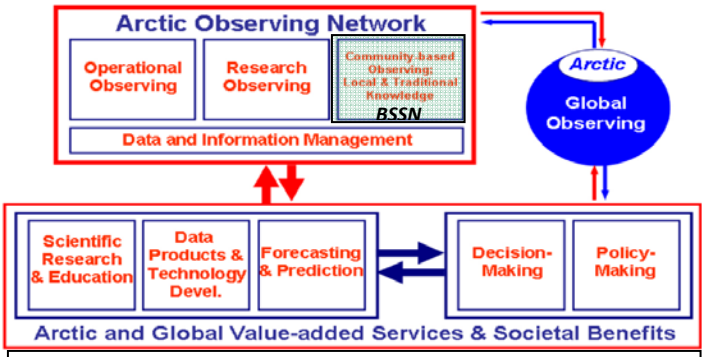


Figure 7. The role of BSSN in Arctic Observing Networks. Source: NRC 2006.

BSSN is engaged in efforts to develop distributed, community-based monitoring networks including SAON (Sustaining Arctic Observing Networks), RAVON (Resilience and Vulnerability Observing Network), and the CBMP (Circumpolar Biodiversity Monitoring Program).

Esther Fayer & Olia Sutton, Community Research Assistants in Togiak, Alaska. (Photo Courtesy of AIA)

Svetlana Petrosyan, Community Research Assistant in Tymlat, Russian Federation (Photo Courtesy of AIA)

Iver Campbell, Community Research Assistant in Gambell, Alaska (Photo Courtesy of AIA)