

Historical Ecology for Risk Management

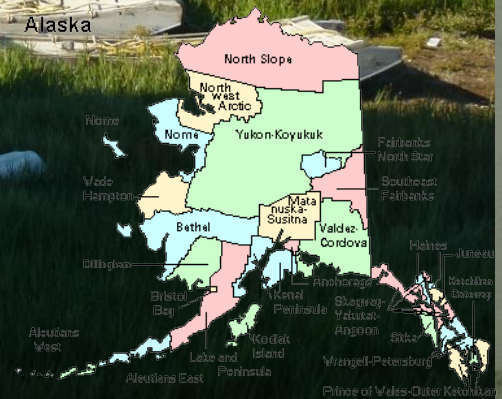
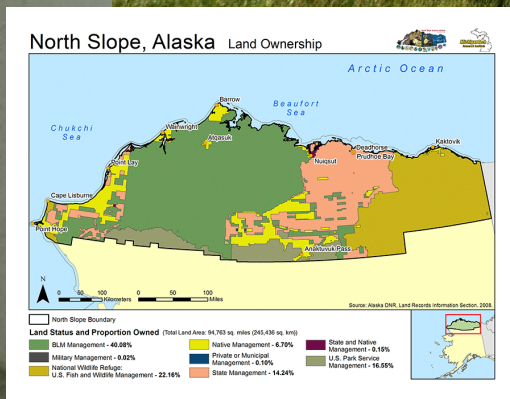
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Risky Business: Community Based Monitoring
AOOSM 2015



Applied Research in Environmental Sciences Nonprofit, Inc.

Anne Garland and Kathleen Fischer Research Associates

MISSION

ARIES is a non-profit research association promoting collaborative research, public education, and public outreach designed to enhance corporate and community based decision making.

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Historical Ecology for Risk Management

Background and Context

1. Risk Management Program- Science and Technology Center of Excellence for Department of Homeland Security

- Working Together for a Safer Tomorrow Program: TIGA(Tribal Inclusive Geographic Areas)
- Cumulative Regional Integrated Operability Score Project (CRIOS) for TIGA Emergency Management



2. Historical Ecology Research Model

- Integration of Historical, Social-Natural Sciences
- Transdisciplinary Applied Research

3. Historical Ecology for Risk Management-Youth Sustainability (HERMYS)

- Research Application with and for North Slope Borough, AK. 2013-present and long term
- Community Based Monitoring : Beach Metrics for Critical Infrastructure

Coastal Observers of Barrow (AkCCO)
2014-long term



Working Together for a Safer Tomorrow

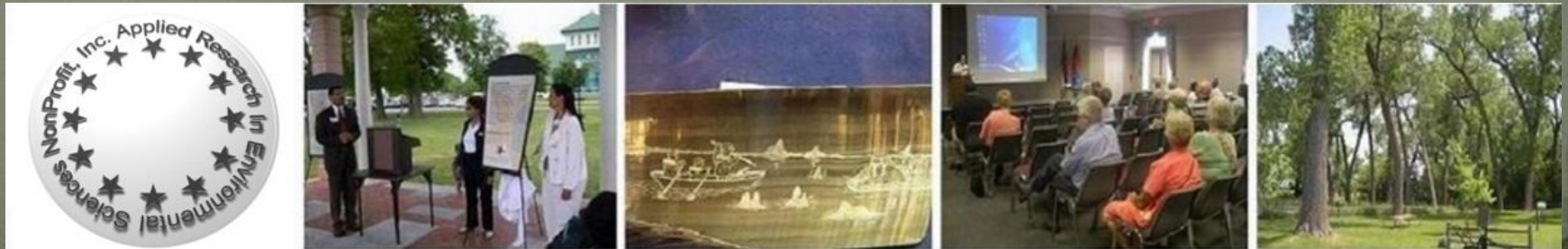
Program:

Applied Research in Environmental Sciences Nonprofit, Inc.
(ARIES)

Sponsor:

DHS National Center of Risk and Economic Analysis of Terrorism
Events (CREATE) Center of Excellence for Science and Technology
DHS Research Associates: Anne Garland and Lloyd Mitchell , Co-PIs

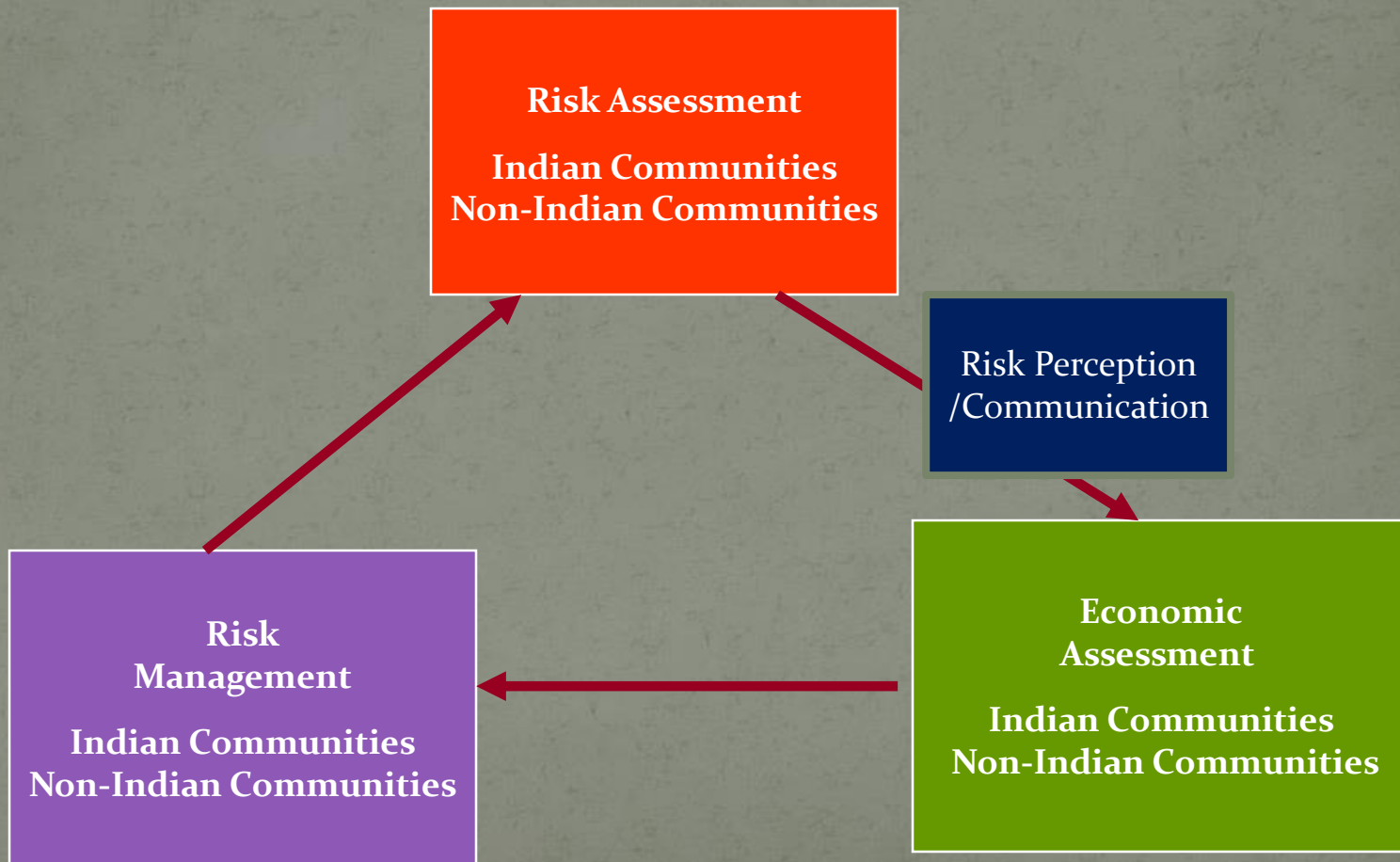
CREATE is an interdisciplinary national
research center based at the University of
Southern California <http://create.usc.edu/>



“Working Together for a Safer Tomorrow”

Research Framework = Research Transitions

(Tribally Inclusive Geographic Area)



Cumulative Regional Integrated Operability Score (CRIOS) 2008 for Tribal Inclusive Geographic Areas (TIGA)

Achieving **regional**, local, and tribal integration to reduce risks and the economic impacts of disaster and terror events



CRIOS Workshop, Cattaraugus Seneca
Reservation, Gowanda, NY, 2009

Critical Indicators
of Regional Operability



The project aligns with DHS Secretary Napolitano First Action Directives of January, 2009, **relative to state, local, and tribal integration.**

<http://www.dhs.gov/news/2009/01/28/secretary-napolitano-issues-first-directives-protection>

CRIOS 2007 (IPY) and 2013-2015 North Slope Borough AK.

- Collaboration with the North Slope Risk Management and Local Emergency Planning Committee for risk workshops (IPY 2007-2008)

- Historical Ecology for Risk Management: Youth Sustainability (2013-2015) [fb journal @arieshermys](#)

- Coastal Erosion Mitigation Study
 - Sea level rise
 - Storm Surge
 - Permafrost Calving
 - NSB RM Priority for Critical Infrastructure



What is historical ecology?

Biocomplexity- *dynamic web of often surprising interrelationships that arise when components of the global ecosystem -- biological, physical, and human –interact. (NSF Coupled Natural and Human Systems Grant)*

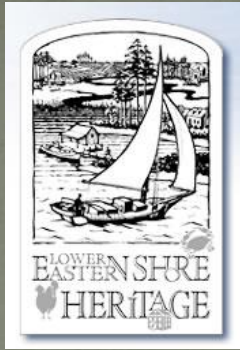
Interactions-*between societies and environments and the consequences of these interactions for understanding the formation of contemporary and past cultures and landscapes. (W. Balee, Tulane University, 1998)*

Integrative and Comparative- *inclusive of temporal, spatial and cultural dimensions (Carole Crumley, University of North Carolina, 1987)*

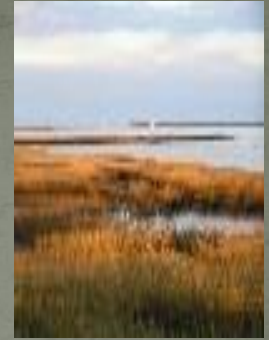
Historical focus *on the dynamics of change. (Carole Crumley, Uppsala , 2011, IHOPE , <http://ihopenet.org/>)*

Complexity Theory (Systems)- *assists modeling of variabilities that have complex rules. These rules include social and natural variables of interaction. (NSF Task force on the Environment for the 21st Century)*

Applied-*historical perspectives increase our understanding of the dynamic nature of landscapes and provides a reference for accessing modern patterns and processes” (T. Swetnam, C. Allen and J. Betanour, “Applied historical ecology: Using the past to manage for the future”, 1999.)*



Collaborations among social and natural sciences along with various public and community entities are hallmarks of this approach.



Interactions among stakeholders (Community Organizations) is essential, using a variety of outreach strategies

Stakeholders - *community groups of all cultural backgrounds, local school systems, municipal governments, state resource management, corporations, and relevant non-profit groups*

Outreach Strategies - *town meetings, community exhibits, workshops, symposia, round-tables, forum panels, websites, local museums, reading materials, technical reports, academic programming (cohort mentoring, project based learning, internships, scholarships), school outreach programs and projects, teacher continued education to apply to learning objectives, and especially, supervised community research and educational programs*

Best Fit Solutions – Transdisciplinary: *Participatory Research, Sustainable Education and Community Service Learning*

Historical Ecology for Risk Management: Youth. Sustainability(HERMYS) **Abstract**

Historical ecology is an applied research program that focuses on

- interactions of people and their environments (social-ecological systems)
- in both time and space
- to gain a full picture of all of its accumulated effects.

The research program can be applied to understanding changes among community landscapes that **can assist management strategies for the future.**

This includes applications to:

- environmental conservation,
- ecosystem services, and
- **hazard mitigations**

For this project, the emphases align with:

- the ARIES mission that combines research, education and community outreach,
- **the Inupiaq Learning Framework, and**
- **the eco-heritage indicator of the CRIOS model** (Cumulative Regional Integrated Operability Scores).

Environment

History

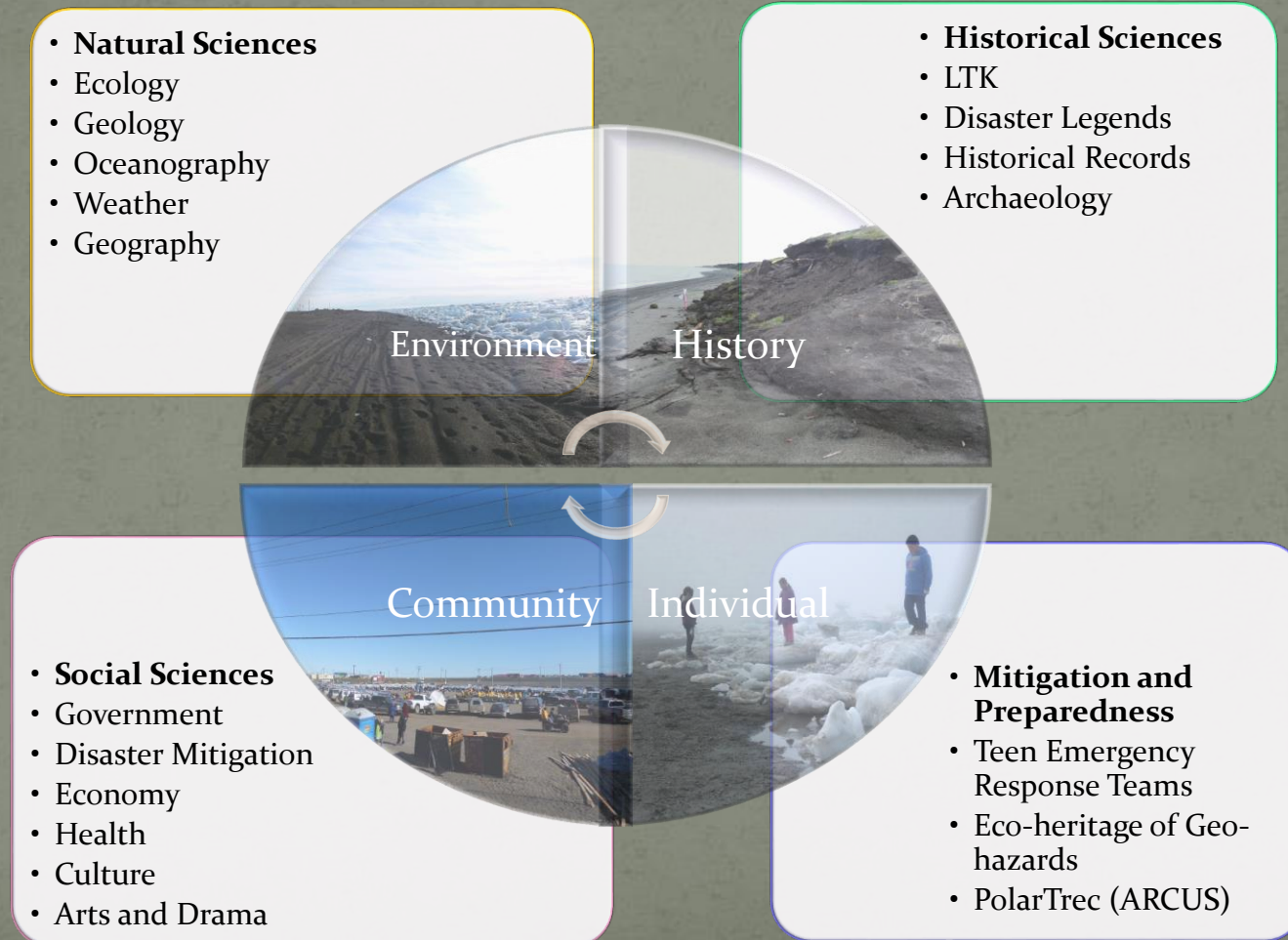
Community

Individual



Inupiaq Learning Framework-Social-Ecological Model
Of the North Slope Borough School District

Historical Ecology for Risk Management: Youth Sustainability(HERMYS) Model



Historical Ecology for Risk Management: Youth Sustainability(HERMYS) **Goals**

The emphases are the following:

- compile a bibliographic database of relevant historical resources of both social and natural sciences,
- conduct an historical examination of the shoreline to provide a time-series baseline,
- develop and test simulation models to demonstrate socio-natural cycles of change for the North Slope shoreline,
- perform a historical ecology study of the shoreline, with interactive mapping and a database available as a web-based resource to assist academia, industry, regional government, and local communities for socio-cultural and environmental management purposes, (Partners: Barrow Area Information Database BAID, www.barrowmapped.net)
- assemble an integrated team who can work with interested researchers, industry, community planners, Native corporations, and NSB Risk Management to extract historical ecology data for models and tools that apply to risk mitigation to assist community based decision making, and
- provide eco-heritage opportunities that include community participation in research, educational products, age-level appropriate activities, and outreach tools for community service learning.



Want to help with some **RISKY BUSINESS?**

Volunteer Citizen Scientists Needed!

All ages welcome

Thursday August 29th, 7:00PM to 9:00PM
OR
Saturday August 30th, 8:00PM to 1:00PM
Tussock Consortium Library

Snacks! **Door Prizes!**

- > Risky **MANICURE** along the Beach
- > **Q&A** challenge about Risky Interactions and Lava Interactions with **SHANE GIBBER***
- > **WALKING** for Citizen Scientists who take the **2008** of the **Q&A** challenge
- > Take the **Heart** (Movie) Challenge!

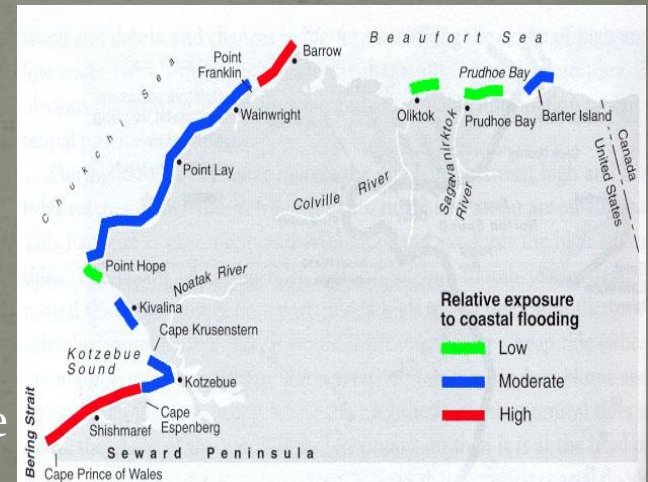
2008 HERMYS LEADERSHIP 2008 HERMYS LEADERSHIP

*Supported by North Slope Borough Risk Management, Youth Safety, and Applied Research in Environmental Science Research, Inc. (NASES). For more information, contact Anne Garland (ANEG) anegard@nase.com or 737-334-9568

Historical Ecology for Risk Management: Youth Sustainability **Natural Sciences** Long-Term Coastal Erosion Studies Barrow, Ak.

Monthly monitoring of coastal erosion

- **Review North Slope Coastal Erosion Studies**
- Erosion critical to *community infrastructure*
 - Wainwright and Point Hope Sea Walls Collapse and Repairs
 - Gravel Sand Berm/Flood Dikes
- **Coastal bluff and berm erosion**
 - sea level rise
 - storm surge
 - bluff collapse
 - permafrost melting
 - loss of near shore sea ice coverage with increase in fall fetch
 - **shoreline armoring and other engineering**



Barrow Hazard Mitigation Plan 2004

Long-Term Coastal Erosion Studies **Natural Sciences**

Possible Coastal Measurements

- berm/bluff heights (berm width)
- berm/bluff vertical (LIDAR)
- beach width (berm/bluff base to waterline)
- seaward face contours
- composition and fabric
- depth to permafrost
- temperature vs depth profiles
- time lapse photography
- differential GPS
- tundra infrastructure diversity and cohesion- e.g., soil pH and infrared webcam for photosynthesis



Examples of Coastal Erosion- Natural and Man Made

Green Engineering and Plant Ecology



Historical Ecology for Risk Management: Youth Sustainability(HERMYS) **Historical Sciences**

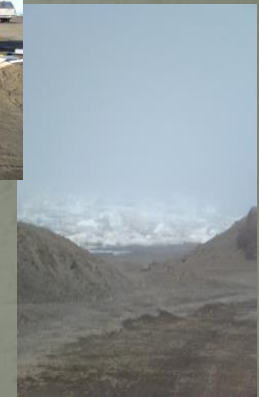
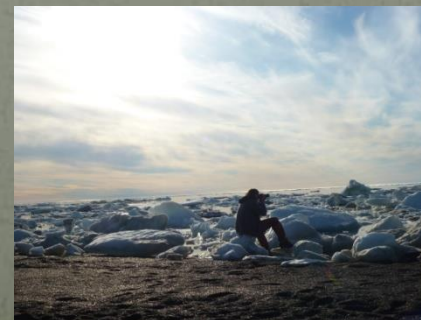
- Disaster Legends
- Disaster Oral History (LEPC Interviews via Skype/Callnote)
- Local Traditional Knowledge of Risks, Mitigation, and Preparedness
- Historical Maps of Coastal Regions of North Slope
- Traditional Settlement Patterns
- **Community and Salvage Archaeology from Coastal Erosion** -
Anne Jensen UIC Senior Scientist Blog <http://iccandtime.wordpress.com/>
 - Nuvuk (Point Barrow)
 - Walakpa
(Wiley Post Memorial)



Long-Term Coastal Erosion and Green Engineering Studies Barrow, Ak.

Community Benefits

- Sections of coast considered most critical to protection of community critical infrastructure
(See Examples in Photos)
- Educational opportunities and materials for local schools, library, community groups
- **Community involvement throughout research program (e.g., Community Based Monitoring)**
- Experiential learning for youth interested in risk management professions
(PolarTREC teachers to assist Teen CERT)
- Results contribute to risk mitigation planning



Citizen Science Training

Geo Challenge

- 7 Critical Areas of City's Beach
 - 2 Pump Stations, Old Landfill, Sewage Ponds, Gas Station, Revetments, Utqiagvik
- Assigned 1 Locale to Monitor
- Monitor 1x per month (fall, spring, summer)
- Monitor 1x after major change from berm maintenance or surge erosion
- Equipment Kits Checked Out (Tuzzy Library)

Go Green Challenge

- Berm/Bluff Plant Colonies of City Beach
 - Decide on # of Locales
 - Random Intervals
 - Non Random Bio diverse Colonies
- Assigned 1 Locale to Monitor
- Monitor 1x per month (fall, spring, summer)
- Monitor 1x after major change from berm maintenance or surge erosion
- Equipment Kits Checked Out (Tuzzy Library)

Citizen Science Training

Beach Erosion Study

Geo Challenge

- Line of Sight, Smartphone, Portable GPS
- Photos from specific GPS Coordinates (seaward/landward)
- Digital Download or Manual Forms (AkCCO)
- Measure Waterline to Berm Base
- Measure Berm Height and Base Width (Revetment Survey)
- Soil Types (Geo-Technical Gauge)
- Upload Forms and Photos to Cloud (google docs and dropbox)
- **Participate in Devoted Facebook with CBM Colleagues @COBCBM**

Berm Plant Ecology Study

Go Green Challenge

- Smartphone or Portable GPS
- Photos from specific GPS Coordinates
 - Scale
 - N Arrow
- Measure width of plant colonies for growth
- Soil Types (Geo-Technical Gauge)
- Plants and ID



ALASKA CORPS OF COASTAL
OBSERVERS

Community Based Monitoring

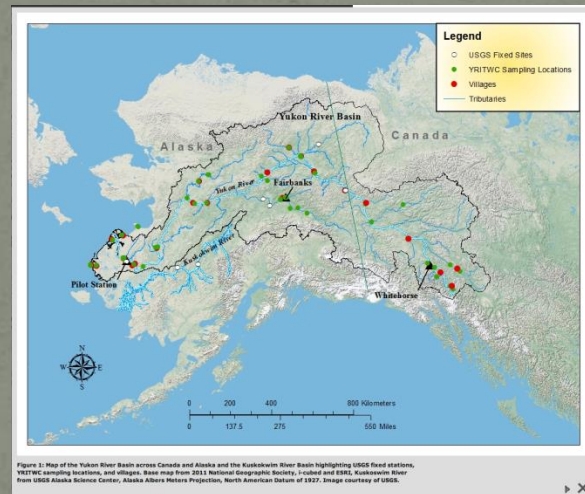
- Community-based monitoring and citizen science programs are expanding throughout Alaska.
- These programs allow local people to participate in the scientific process
- Observe environmental phenomenon on front lines of change
- Alaska Ocean Observing System and Alaska Sea Grant Best Practices

<http://www.aous.org/community-based-monitoring/>

<http://seagrant.uaf.edu/conferences/2014/community-based-monitoring/index.php>

Atlas of Community Based Monitoring in a Changing Arctic

Example: [Yukon River Inter-Tribal Watershed Council \(YRITWC\)](#)



http://www.arcticcbm.org/index.html?modules=module_arcticcbmAlaska

Citizen Scientists

- Scientific research conducted, in whole or in part, by amateur or nonprofessional scientists, often by crowd sourcing and crowd funding
- Formally defined as "the systematic collection and analysis of data; development of technology; testing of natural phenomena; and the dissemination of these activities by researchers on a primarily avocational basis".^[1]
- Sometimes called "public participation in scientific research."^[2]
- Limitations?
 - The question of data accuracy
 - Some projects may not be suitable for volunteers, such as complex research methods or require arduous or repetitive work.
 - Volunteers have insufficient training in research and monitoring protocols, they are more at risk of introducing bias into the data.^[3]
 - Members may be inaccurate about data. This risk is even greater when bounties are awarded as an incentive to participate.

http://en.wikipedia.org/wiki/Citizen_science

Citizen Artists and Communicators Media Challenge!

Semester Prizes

Art

Logos

Poetry

Stories

Legends

Photography

Videos

Radio PSA

SEPTEMBER IS NATIONAL PREPAREDNESS MONTH



AMERICA'S
PrepareAthon!



Ready



Awards

- Time Share Week
(Interval International)
- Gift Cards
- Youth Scholarships for Risk Preparedness Projects
(STEAM)
- Logo Shirts or Hats



Historical Ecology for Risk Management: Youth Sustainability (HERMYS)

Want to help with some

RISKY BUSINESS?

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OR

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Tuzzy Consortium Library

Snacks!

Door Prizes!

- Risky **EROSION** along the Beach
- **GEO Challenge** about Risky **Erosion** and Less **Erosion** with "GOING GREEN"
- **AWARDS** for Citizen Scientists who take the **RISK** of the **GEO Challenge**
- Take the Hazard **Charades** Challenge!



SEPTEMBER IS NATIONAL PREPAREDNESS MONTH



Sponsored by North Slope Borough Risk Management, Tuzzy Library, and Applied Research in Environmental Sciences Nonprofit, Inc. (ARIES)
For more information, contact Anne Garland (ARIES) ariesnonprofit@yahoo.com or 757-334-9568

North Slope Coastal Erosion Bibliography

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- <http://www.ariesnonprofit.com/ARIESprojects.php> CRIOS
- <http://iceandtime.wordpress.com/> Anne Jensen Blog -UIC Senior Scientist
- <http://www.fema.gov/video-materials#teen> Teen CERT
- <http://www.polartrec.com/expeditions/historical-ecology-for-risk-management> PolarTREC
- <http://www.nsbdsd.org/domain/44> NSB School District Inupiaq Learning Framework
- <http://www.inupiaheritage.org/our-culture> Inupiat Heritage Center - Inupiaq Learning Framework
- <http://www.philaprintshop.com/alaska.html> Map-Chicago: George F. Cram, ca. 1880, Color cerograph

QUESTIONS and SUGGESTIONS?

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Facebook Journal @arieshermys

Community Service Learning

Participatory Research Projects

Historical Ecology for Risk Management: Youth Sustainability(HERMYS)

Eco Heritage Community Service Learning **Goals**

RIA Framework and Emphases (Risk Interpretation and Action-See References):

- Community Based Monitoring for Beach and Sea Ice Metrics-Coastal Observers of Barrow (COB CBM)
- Community Salvage Archaeology of Threatened Sites from Coastal Erosion
- Teen Community Emergency Response Team (CERT).
- PERCIAS Applied Theater (Perceptions of Risk Communication, Interpretation, &Action in SES Systems)
- Youth Habitat Corps for Arctic and Tundra Gardens (Food Security and Public Health)
- **PolarTREC Teachers** assist with research and eco-heritage data for disaster preparedness among the “Next Generation”, that is, middle and high school students
- NSB Risk Management Risky Business Camps
- North Slope Borough Preparathons for North Slope School District (STEAM Challenge)

Want to Help with
Risky Business?
Join the STEAM Challenge



The North Slope Preparathon
September 2015!
MEET the challenge post a STEAM product
(Science, Technology, Engineering, Art, and Math)
on the Fb @North Slope Teen CERT

*Push the arts (photos, any artwork), media, (music, video/audio/PSA), drama (dance, skits, role plays) or language arts (oral history, stories, slogans, poetry) by Teams or Individuals

*Reach out to your peers and friends about North Slope RISKS and how to prepare for the HAZARDS

*Enter for the awards by the NSB Risk Management who can use your work in NSB risk education efforts. (Your permission and credits to use your creative property will be respected as you wish.)

*Plan for a Talent Show and Exhibit
Depending on the number of entries, there may be enough for a TALENT SHOW, too!
More details later!

<http://www.arctic.gov/steamcenter> www.steam.org 5.4.2015

DEMIAC Contact Nina Kwon
NSB Coastal Coordinator



DON'T WAIT. COMMUNICATE.
MAKE YOUR EMERGENCY PLAN TODAY.



SEPTEMBER IS NATIONAL PREPAREDNESS MONTH!

Citizen Scientist for Coastal Erosion Metrics and Observations



Storm Surge
8.1.2014

