Are Healthy Sustainable Alaskan Communities Attainable? Change and Innovation in Northwest Alaska Communities

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24th Annual Tribal Conference on Environmental Mgt

Nov. 27, 2018

LUPINE ROOM HILTON ANCHORAGE, ANCHORAGE, AK

Contents

The Arctic is a “Bellwether” for Changes in the Environment

Climate change is real!

- **Northwest Arctic Borough** lies above the Arctic Circle; along with Alaska’s North Slope, key areas making the USA an Arctic nation

Governance issues are prominent and dynamic on the global stage

The **8-Nation Arctic Council is led by Finland (2017-19_**as Chair), USA, Canada, Kingdom of Denmark (Greenland), Iceland, Norway, Russia & Sweden.

Environmental Health professionals & practitioners improve the quality of life of Alaska Native populations by **implementing programs & practices** that connect environmental quality with human health outcomes**.**

Contents 2

GLACIER: The White House conference held in Alaska (Aug. 2015)

International Epidemiological Association's 20th World Congress of Epidemiology took place in Anchorage, Dena'ina Convention Center, August 14-17, 2014 *Theme:* Climate Change and Health

Policy sets direction in the Arctic, sustainable or NOT sustainable matters.

Stakeholders & the Arctic Landscape

- United Nations Intergovernmental Panel on Climate Change (IPCC) released the IPCC 5th Assessment on March 31, 2014
- WHO/WMO World Health Organization, World Meteorological Org.
- Professional associations with an environmental public health focus For example, the American Public Health Association (APHA)

  the National Environmental Health Association (NEHA) & AEHA
  - Global reach, connecting public health practitioners & academics
- State and federal agencies have prominent roles in addressing issues

Contents 3

Arctic Landscape: Key Actors Shaping Arctic Governance

- **Arctic Council**, formerly Chaired by the United States Apr. 24, 2015 – May 11, 2017. On May 11, 2017, Finland assumed the Chair role for the period 2017 – 2019.
  - **Climate change and health** has been stated to be an essential part of Finland's role as the leader/convener of Arctic Council working groups and activities. www.arctic-council.org/index/php/en/
- **U.S. Arctic Research Commission**
- **State of Alaska**: State of Alaska Legislature, Gov.& Executive branch Cabinet-level agencies
- Federal government agencies & non-governmental organizations (NGO's) with stakes in the Arctic

Plethora of policies, programs, and projects

Contents 4

Alaska and Federal Agencies are Integral to Decision-Making and Policy Making Processes

- Alaska Native Tribal Health Consortium
- U. of Alaska ➔ especially U. of Alaska, Fairbanks institutes such as SNAP, ACCEP, ACEP, CCHRC, & UAF Cooperative Ext.
- Academic researchers from across the US and throughout the globe with a focus on addressing climate resiliency in Arctic regions.
- U.S. Arctic Research Commission
- Federal Agencies: US Environmental Protection Agency, US Dept. of Interior, US Dept. of Agriculture, US Dept. Health & Human Services, NIH, NIEHS, Dept. of Energy, Dept. of Defense

Arctic Council Working groups

- Sustainable Development Working Group (SDWG)
- Emerging: Arctic Economic Council (AEC)
- Scientific Cooperation in the Arctic

Contents 5 (Cont.)

Case Studies: Current Lessons from America's portion of the Arctic

Northwest Arctic Borough (Inupiat) and Southwest Alaska (Yup'ik)

- Shismaref, an Inupiat Alaskan village near Nome, Alaska
- Kivalina, possibly $ 200 million to relocate from barrier island
- Selawik in the NAB
- Installing piped drinking water and sanitation, ANTHC flagship program is the Alaska Rural Utility Collaborative (ARUC)
- Sustainable utilities, improving energy efficiency. Over $2 billion invested in water and sewer in AK villages since 1985

Preliminary Findings regarding changes in environmental conditions and adaptation responses to climate change. Governance challenges. Rogue nations. Loss of biodiversity. Polar bears matter, but so do people! Paris climate accord. Making the planet great again!

S**ocial and economic impacts** are the result of changes in environmental conditions driven by climate change.

Contents 6

Environmental Health Practitioners at the Leading Edge of Environmental Public Health

Intersection of environment quality & human health through understanding of climate change impacts / opportunities.

Understanding decision making; supporting incorporation of sound scientific and technical judgment; navigating politics and bureaucratic responses; improving governance through development of programs that foster resilience.

Mitigate the impacts of resource development;

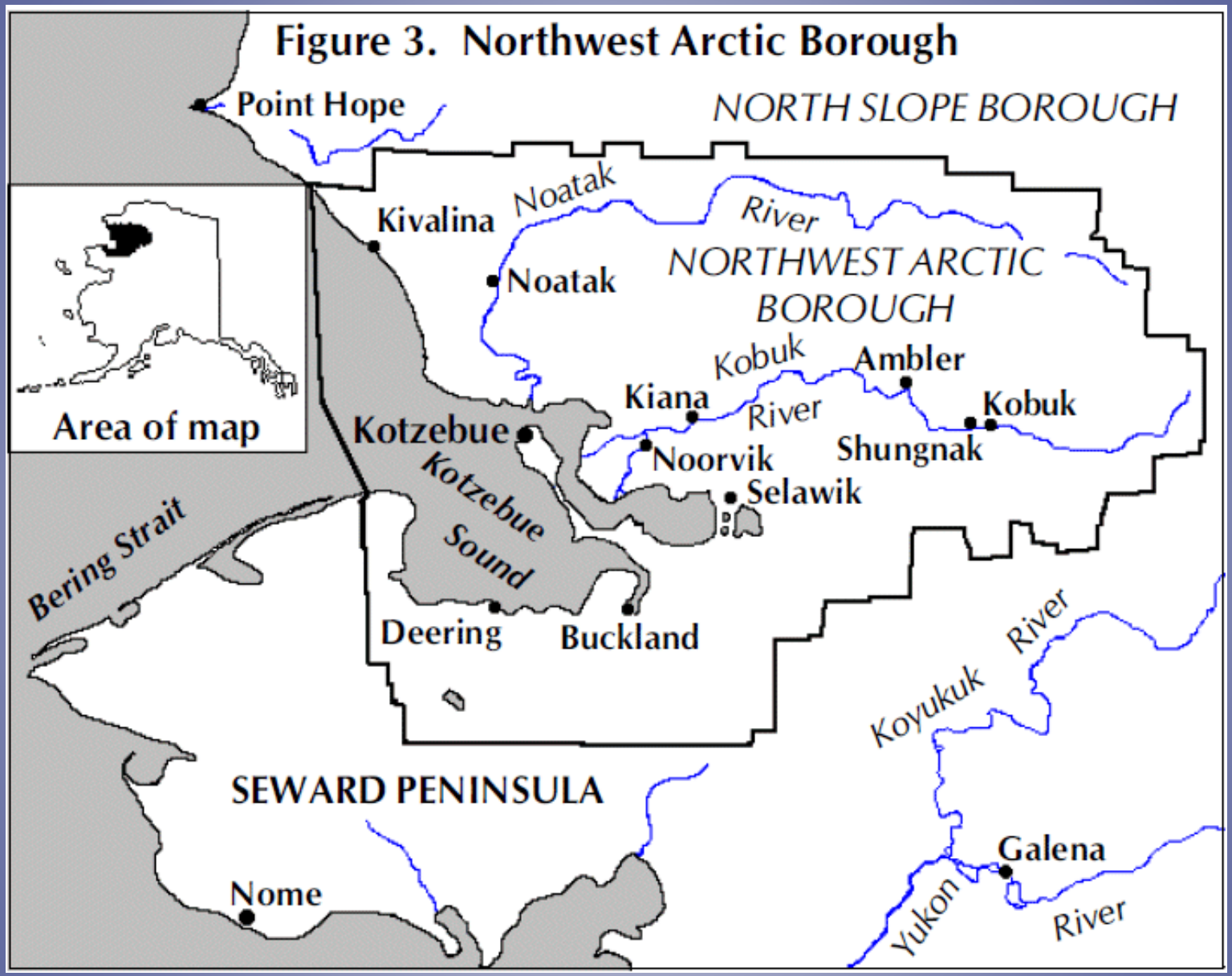
Developing priorities to address the impacts of climate change on maintaining or improving the health of communities.

Arctic Geographic Context

- For the most part, the Northwest Arctic Borough lies above the NW Arctic Circle in latitude.
  - It is the parallel of latitude that runs 66° 33′ 44″ (or 66.5622°) north of the Equator.
  - The region north of this circle is known as the Arctic, and the zone just to the south is called the Northern Temperate Zone.


Bering Sea
Provideniya
Magadan
Okhotsk
Nome
Anadyr
Anchorage
Valdez
Fairbanks
UNITED STATES
Chukchi Sea
Pevek
Cherskiy
Dawson
Perkatkun
Wrangel Island
East Siberian Sea
Barrow
Prudhoe Bay
Verkhoyansk
Inuvik
Beaufort Sea
CANADA
New Siberian Islands
Tiksi
Echo Bay
Yellowknife
Sachs Harbour
Kotel'nyy
Laptev Sea
Banks Island
Victoria Island
Cambridge Bay
Arctic Ocean
Queen Elizabeth Islands
Severnaya Zemlya
RUSSIA
Hudson Bay
Repulse Bay
Ellesmere Island
Noril'sk
Dikson
Alert
Franz Josef Land
RUSSIA
Thule
Kara Sea
Baffin Island
Baffin Bay
Novaya Zemlya
Nord
Barents Sea
Longyearbyen
GREENLAND
DENMARK
Svalbard
NORWAY
Labrador Sea
Sondre Stromfjord
Nuuk
Greenland Sea
Murmansk
Scoresbysund
Tromso
Arkhangel'sk
Ammassalik
Norwegian Sea
FINLAND
ICELAND
NORWAY
SWEDEN
Reykjavik
Helsinki
Atlantic Ocean

The Arctic boundary features Alaska, as defined by the U.S. Congress
(P.L. 98-373, The Arctic Research Policy Act of 1984).



http://www.north-slope.org/departments/wildlife-management/co-management-organizations/ice-seal-committee/isc-research-projects/isc-harvest-documentation


Kotzebue
Selawik

Geography

Community	Location	Population
Ambler	Inland	258
Kobuk	Inland	151
Shungnak	Inland	262
Kiana	Inland	385
Buckland	Inland	420
Noatak	Inland	514
Kivalina	Coastal	400
Kotzebue	Coastal	3294
Deering	Coastal	133
Selawik	Coastal	841
Noorvik	Coastal	668

Kivalina and Kiana

Region Profile

- NAB was formed in 1986: 11 communities
- Size of Indiana
- Region is remote and isolated with no connecting roads between communities or with the rest of the state
- 85% of residents are Inupiat Eskimos
- Unemployment ~15.6%. The median household income: $45,976.
- 17.4% of the population: incomes below the poverty level

Region Profile, Northwest Arctic Borough

- Median age of population ~23 years old (2008)
- 40% of the Northwest Arctic Borough's employment is in government
  - Comparison: 25% for the State of Alaska.
- 46.6% female; 53.4% male
- Climate: long, cold winters,cool summers.
- Temperatures range: -52 to 85 degrees F.
- Total precipitation averages:

9 in./year and Average annual snowfall 47 in

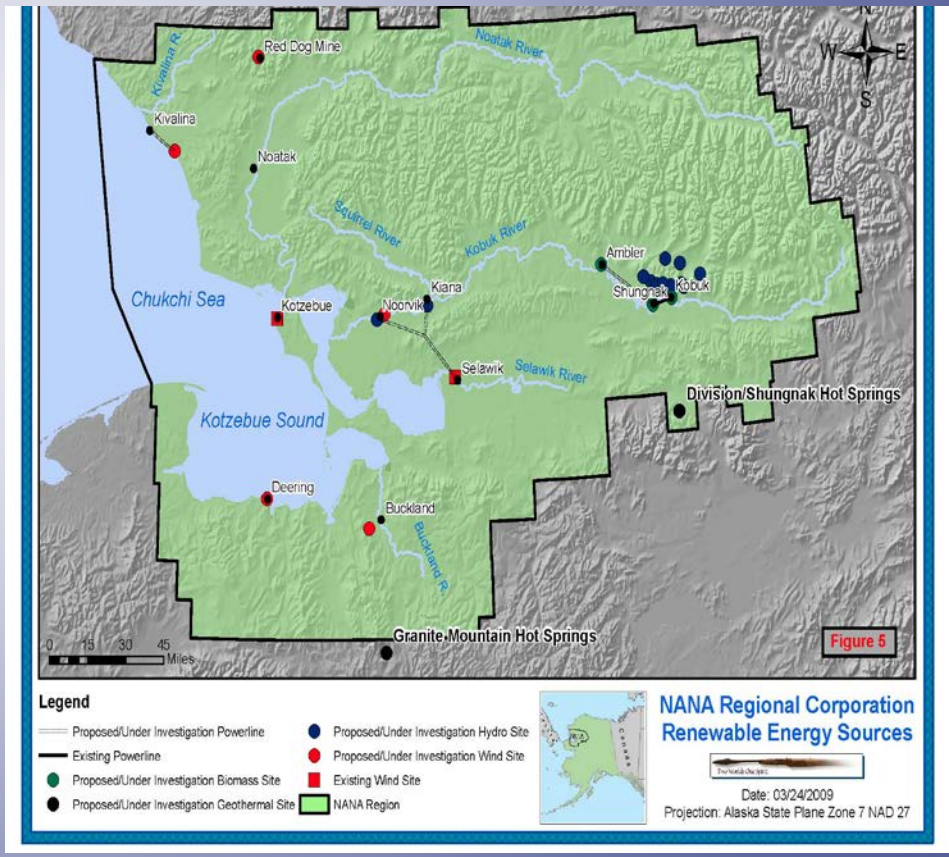
- Home to the Red Dog Mine
- Subsistence is a critical activity

http://www.nwabor.org/about.html

Renewable Energy

Total annual (non-transportation) energy consumption by communities in NW Alaska is estimated to be **5.3 million gallons** in diesel fuel or equivalent, not including the operations of the Red Dog Mine and port.

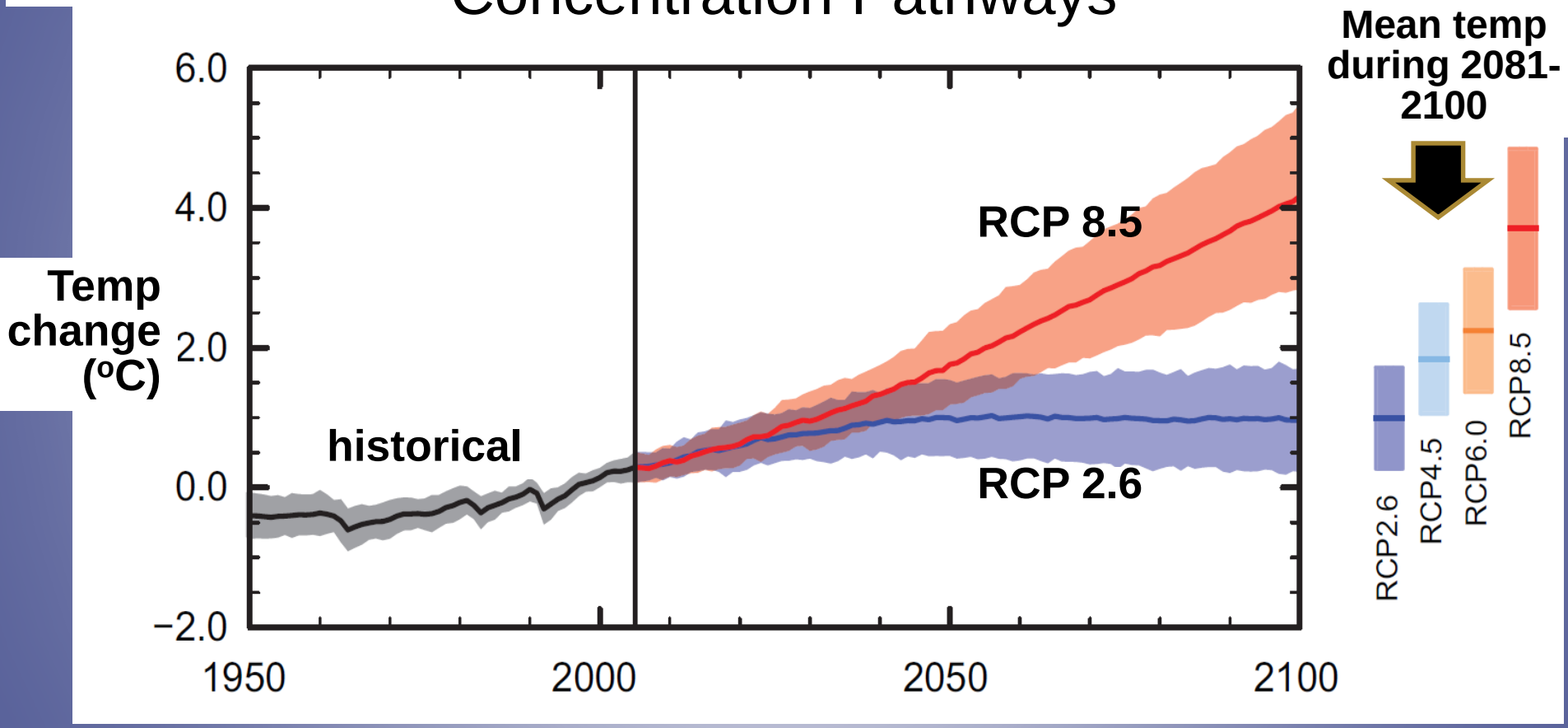
- Dependent on heating oil and gasoline.
- Stove oil: $5/gallon, median monthly expenditure $530. The cost of wood varies from $120-$500. Electricity costs about $258 per month
- Wind, biomass, solar, hydroelectricity, geothermal energy sources. What sources fit specific communities?
- Red Dog mine is shown as the red dot in upper LEFT; important PILT payments (payments in lieu of taxes to NAB)



Global Trends Driving Changes in Environmental Conditions

https://www.climate.gov/sites/

Projected Change in Global Average Surface Temperature for Different 'Representative' Emission-Concentration Pathways



Intergovernmental Panel on Climate Change (IPCC). Fifth Assessment Report, Working Group 1, 2013

Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (Vol 1, 2013)

1. Stronger evidence that **Earth's climate is warming:** rising air and ocean temperature, loss of mass of glaciers/ice-sheets, rising sea level.

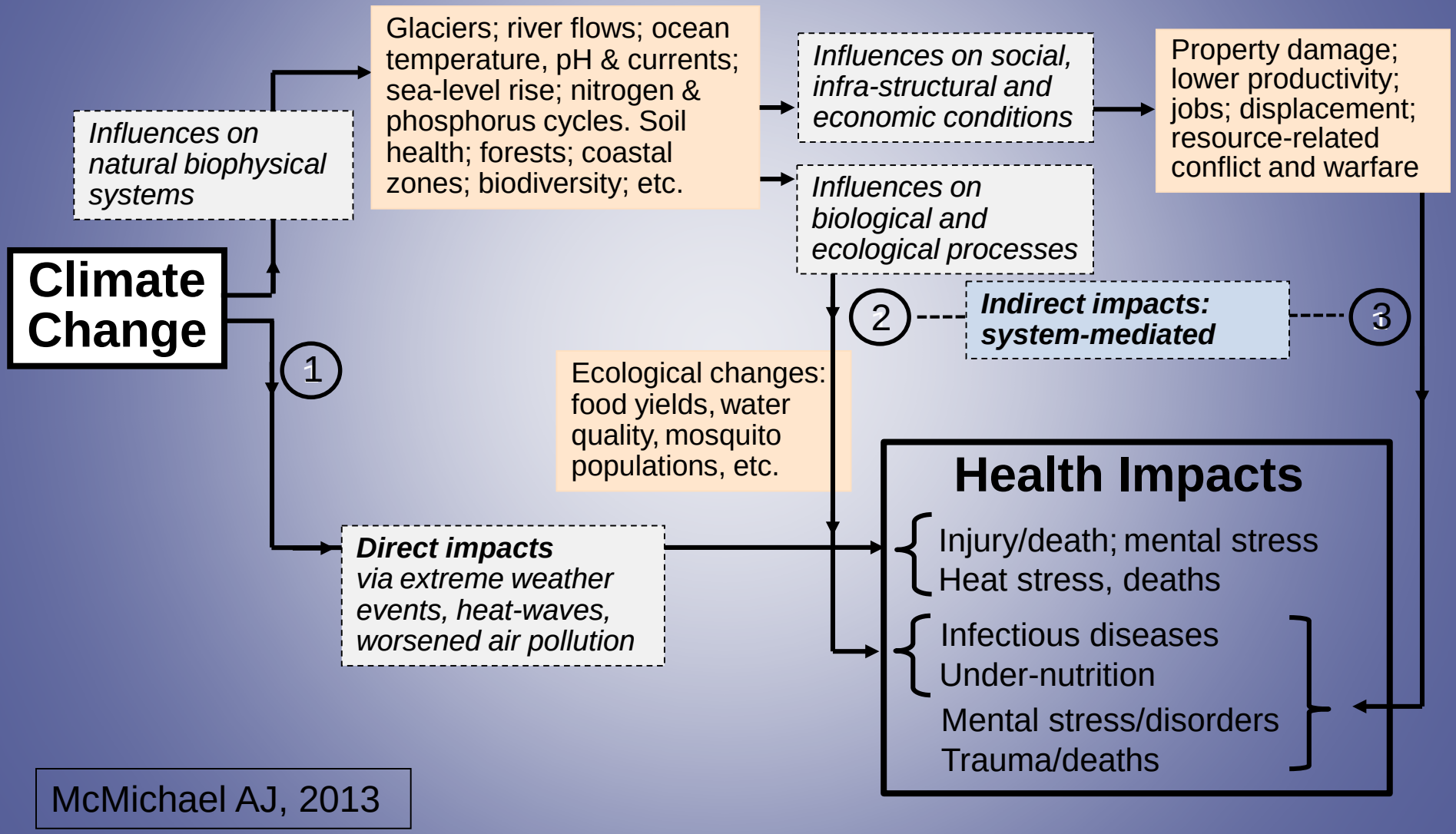
2. Scientists are now more certain that **most warming since 1950 has been caused by human activities**, primarily CO_2 emissions from fossil fuel combustion.

3. Warming is influencing frequency and severity of many **extreme weather events**, rainfall patterns, & creating risks for human well-being, health, the economy and environment.

4. Stabilising the climate system will require very substantial and sustained **reductions of carbon dioxide emissions** and of other greenhouse gases.

Energy policy implications: To comply with the steadily tightening budget of tolerable CO_2 emissions, it is estimated that 3/4 of the world's proven coal deposits must be left in the ground. Should we propose to open ANWR to drilling for oil and gas in a world with + 2−4˚ C temperatures?

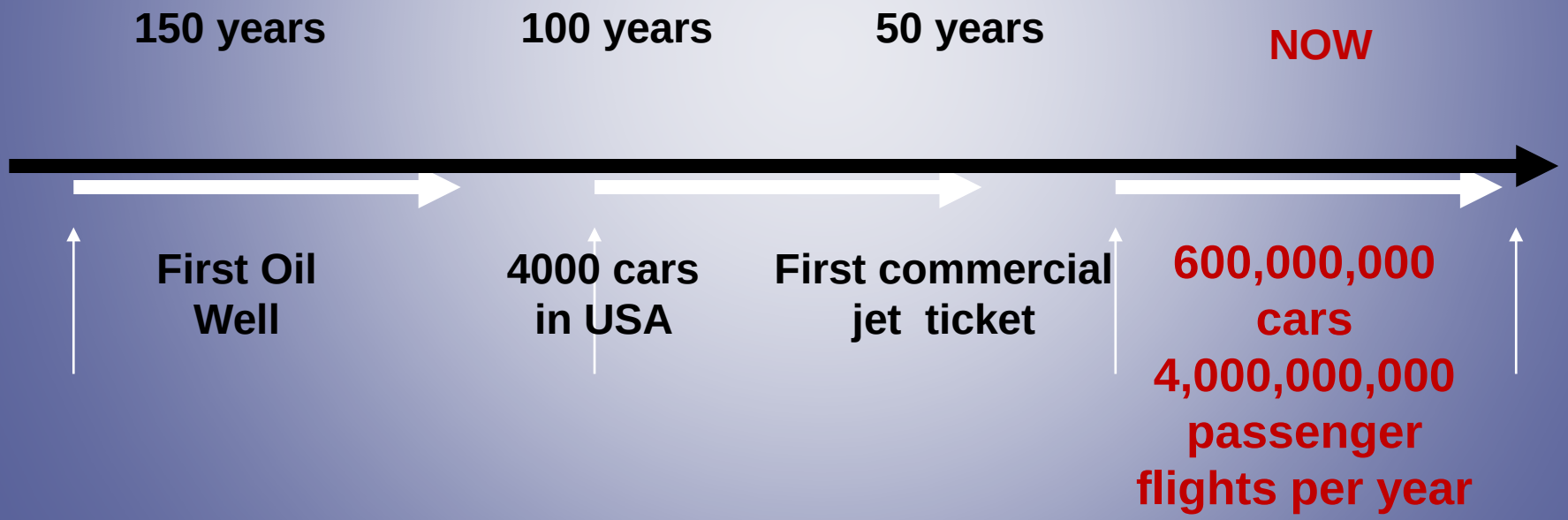
Climate Change: Health Impact Pathways



McMichael AJ, 2013

Global addiction to oil as population rises: Very cheap, very useful and very dangerous

In the last 150 years we have been releasing 350 million years-worth of carbon locked away in fossil fuels



BMJ

Climate change

THE LANCET

Volume 373 · Number 9676 · Pages 1659-1734 · May 16-22, 2009

www.thelancet.com

"Climate change is the biggest global health threat of the 21st century."

See The Lancet Commissions page 1693

Although climate change can cause illness and death directly…

There are multiple risks

The Intergovernmental Panel on Climate Change

Findings from Key Working Group Assesments

5th Assessment, Final Reports

(released Oct., 2014)

"Alaska on 'front lines of climate change'*

"Fixing Alaska's climate-related damage could cost $110 million to $270 million a year…". AND, p.1. November 25, 2018

_____

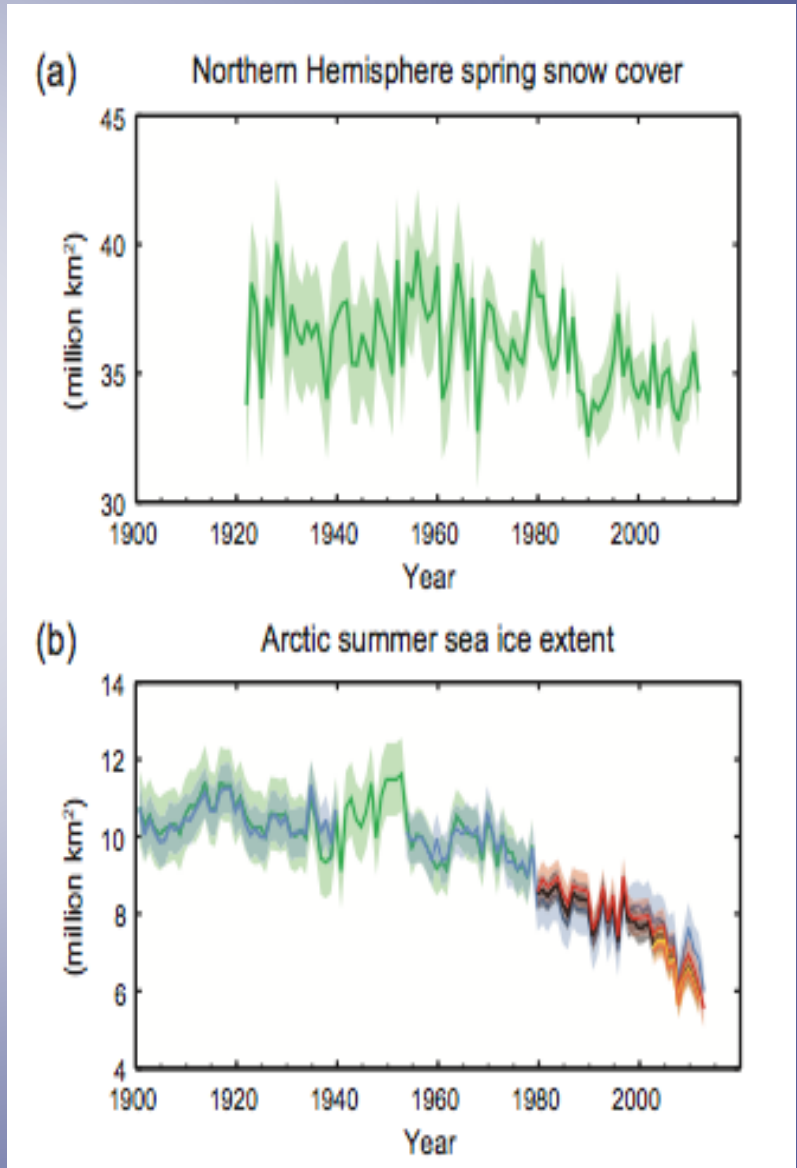
*Fourth National Climate Assessment report

WG I & the Arctic

- Observed warming in northern Alaska was up to 3° C in parts from the early 1980s- mid 2000s (WG1 SPM, p.9) *HC*
- The Arctic region will warm more rapidly than the global mean, and mean warming over land will be larger than over the ocean (p.20) *VHC*
- By the end of the 21st century, the area of permafrost near the surface (3.5m) is projected to decrease anywhere from 37-81% (p.25)

WG I: Arctic Findings

- Multiple lines of evidence support very substantial Arctic warming since the mid-20th century (WG1 SPM, p.9)
- One model projects that there will likely be a nearly ice-free Arctic Ocean in September before mid-century (p.25)
- Downward trend in Arctic summer sea ice extent since 1979 is now reproduced by more models than in AR4 (WG1 SPM, p.9)
  - It is very likely that Arctic sea ice cover will continue to shrink/thin and spring snow cover will decrease during the 21st century (p.24)



WG II: Arctic Vulnerability

- Climate-related hazards exacerbate other stressors, often with negative outcomes for livelihoods, especially for people living in poverty (p.8) *HC*
- Changing precipitation/melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality (p.6)
- Climate change is causing permafrost warming/thawing in high-latitude regions in high-elevation regions (p.6) *HC*

WG II: Arctic Vulnerability

- Terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions in response to ongoing climate change (p.6) *HC*
- Ocean acidification poses substantial risks to marine polar ecosystems (p.17)

Arctic Risks

- **High confidence risks: (p.12)**
  - Disrupted livelihoods in low-lying coastal zones due to storm surges, coastal flooding, and sea-level rise
  - Systemic risks due to extreme weather events leading to break down of infrastructure networks and critical services
  - Risk of food insecurity and break down of food systems
  - Risk of loss of rural livelihoods and income

Arctic Risks

- High confidence risks: (p.12)
  - Risk of loss of marine and coastal ecosystems, biodiversity, and ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the Arctic
  - Many species and systems with limited adaptive capacity are subject to very high risks with additional warming of 2° C, particularly Arctic sea ice (p.13)
  - Climate change is projected to reduce raw water quality due to:
    - Increase temperature, sediment, nutrient, and pollutant loading from heavy rainfall or drought (p.15)

WG II: the Arctic & Adaption

Adaption is place and context specific, with no single approach for reducing risks appropriate across all settings (p.22)

Indigenous, local, and traditional knowledge systems/practices are a major resource for adapting to climate change. They are not consistently used in adaption efforts, but would increase the effectiveness of adaption (p.23)

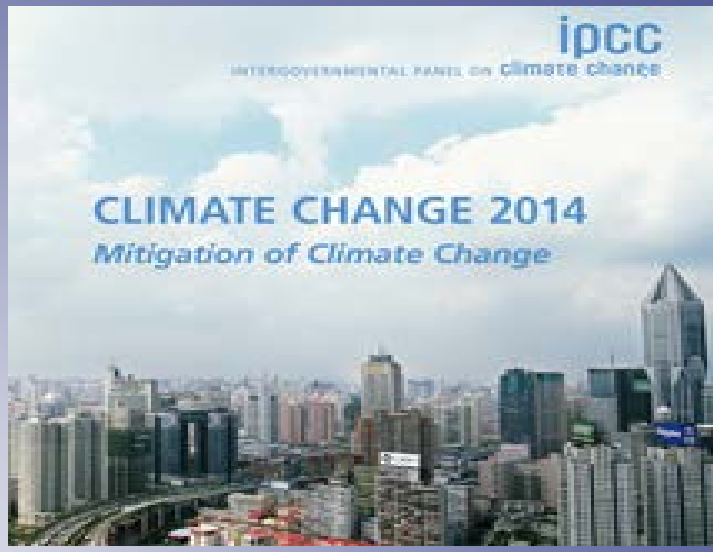
- Important to integrate adaption and climate change considerations into existing programs such as risk/water management and development (p.8)
- Most effective vulnerability reduction measures for health in near-term are programs that implement and improve basic public health measures (clean water, sanitation, health services, and disaster preparedness) (p.20)

WG II: the Arctic & Adaption

Adaption is place and context specific, with no single approach for reducing risks

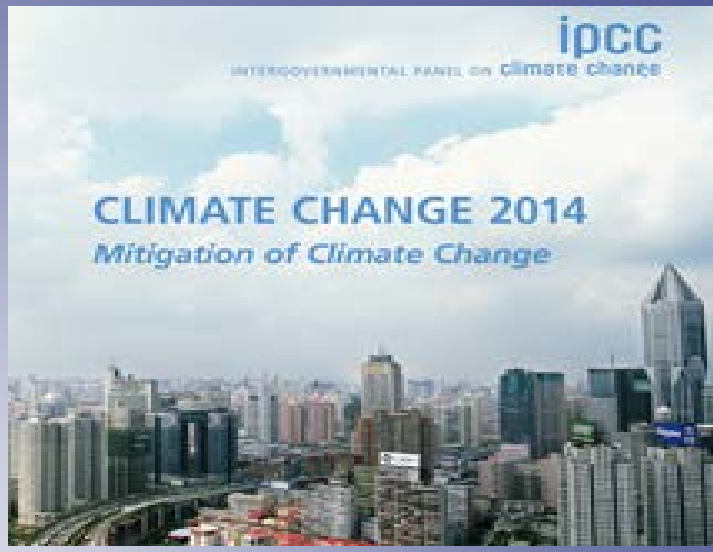
- Displacement risk increase when populations lack the resources for planned migration and experience exposure to extreme weather events (p.20)
- Sustainable development is a climate-resilient pathway because it combines adaption/mitigation for reducing the impact of climate change

WG III: Mitigation



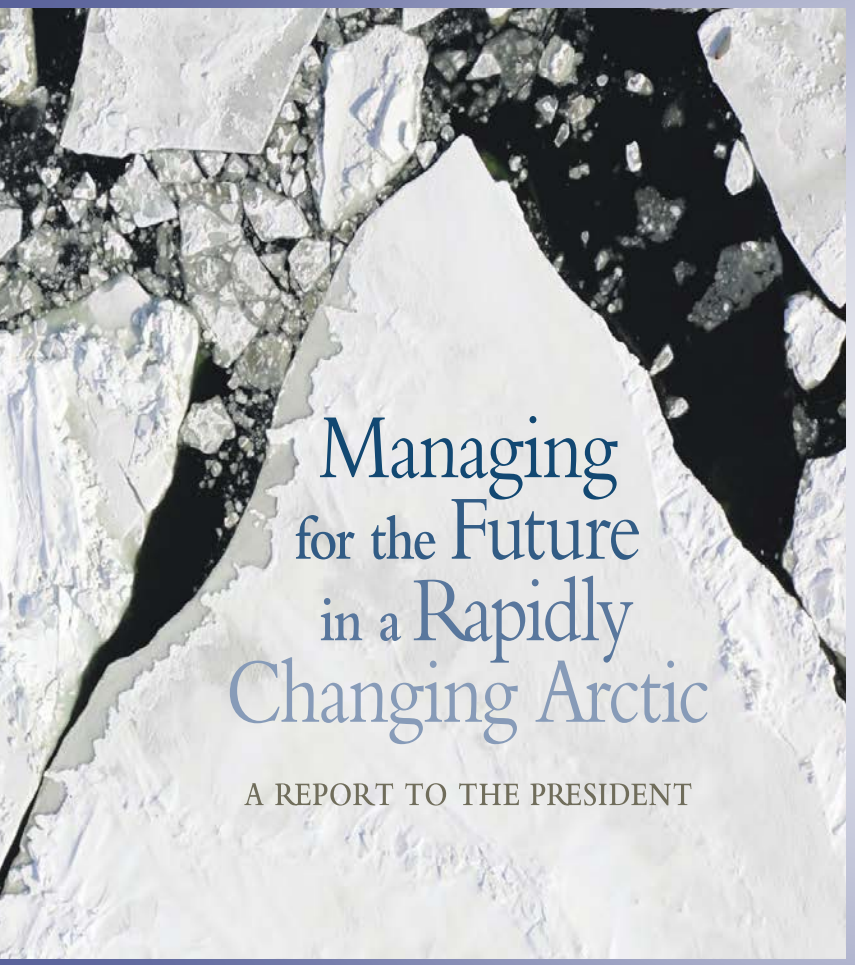
- Infrastructure develops and long-lived products that lock societies into GHG-intensive pathways may be difficult or costly to change, important to have early action for ambitious mitigation (p.20)
- Important to avoid lock-in to carbon-intensive infrastructures (p.21)
- Behavior, lifestyle, and culture have considerable influence on energy use and emissions (p.22)

WG III: Mitigation



- Renewable Energy technology have demonstrated substantial performance improvements/cost reductions since AR4 (p.23)
- Mitigation option for building have considerable co-benefits along with energy cost savings (p.26)
- Bioenergy systems can play a critical role for mitigation (p.28)

Research Agendas & Policy



USA Overarching Policies
Author:Office of the President (OSTP), Federal Agencies

- Arctic Council
  - All 8 arctic countries are permanent participants
    - Arctic Native councils are permanent members
  - 2011 achievement: 8 nations signed Arctic Search & Rescue Agreement
  - 2013: Oil spill response cooperation agreement signed
  - Secretary of State Kerry appointed Admiral Papp Special Ambassador to the Arctic for the U.S.
- The US Arctic Research Commission issues Goals & Objective reports

Arctic Council Leadership

Founded in Ottawa, CN in 1996

Binding Agreements among the 8 Circumpolar North Nations (by Consensus)

- Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, signed in Nuuk, Greenland, at the **2011 Ministerial Meeting**.
- The second, the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic, was signed in Kiruna, Sweden, at the **2013 Ministerial Meeting.**

Proposed community utility

Borough residents struggle to pay high water/sewer bills

	Current bill per month	Delinquency rate, 2017
• Ambler	$210/month	47%
• Buckland	$175/month	12%
• Deering	$105/month (sewer only)	41%
• Kiana	$140/month	13%
• Kobuk	$200/month	58%
• Kotzebue	$134.61/month (excludes garbage)	35%
• Noatak	$138/month	50%
• Noorvik	$157.50/month	31%
• Shungnak	$180/month	54%
• Selawik	$200/month	94%

  - Over $1 million is owed in delinquent payments!

Goals of proposed Borough Community Utility Assistance Program

1. Cut average residential water/sewer bills by 2/3
2. Reduce the number and cost of emergencies
3. Provide regional training and support for operators and administrators
4. Increase construction grant funding for villages

Not enough money for preventative maintenance leads to:

1. Winter time emergencies which are expensive and leave residents without water and sewer for months at a time
2. Low Best Practice scores, leading communities to lose out on grants needed to build or improve their water/sewer system.

Working together, how can the Borough help?

1. Reimburse village water/sewer operator labor costs & benefits
2. Purchase bulk fuel for village water systems
3. Pay for customer billing service
4. Provide training money for operators and administrators
5. Hire a regional utility coordinator to provide assistance to operators. The coordinator would work closely with the Maniilaq RMW

Working together, how can villages help?

1. Continue to own the water/sewer system and hire local operators
2. Reduce water/sewer bills
3. Collect money from all customers each month
4. Build up an emergency reserve
5. Complete monthly preventative maintenance and budgets

Best Practice scores increase the chance of grants to build or improve water/sewer systems. They will also help insure children have the healthy benefits of water/sewer into the future.

"I love clean water because it could make me run faster and be healthier." **Anaya Dozette**

"Clean water could help me stay healthy so I won't get sick." **Jallissa Kelly**

"Clean water can make my bath better." **Rochelle Cleveland**

Back row- Clara Maude Cleveland, Beverly Dean (Teacher)

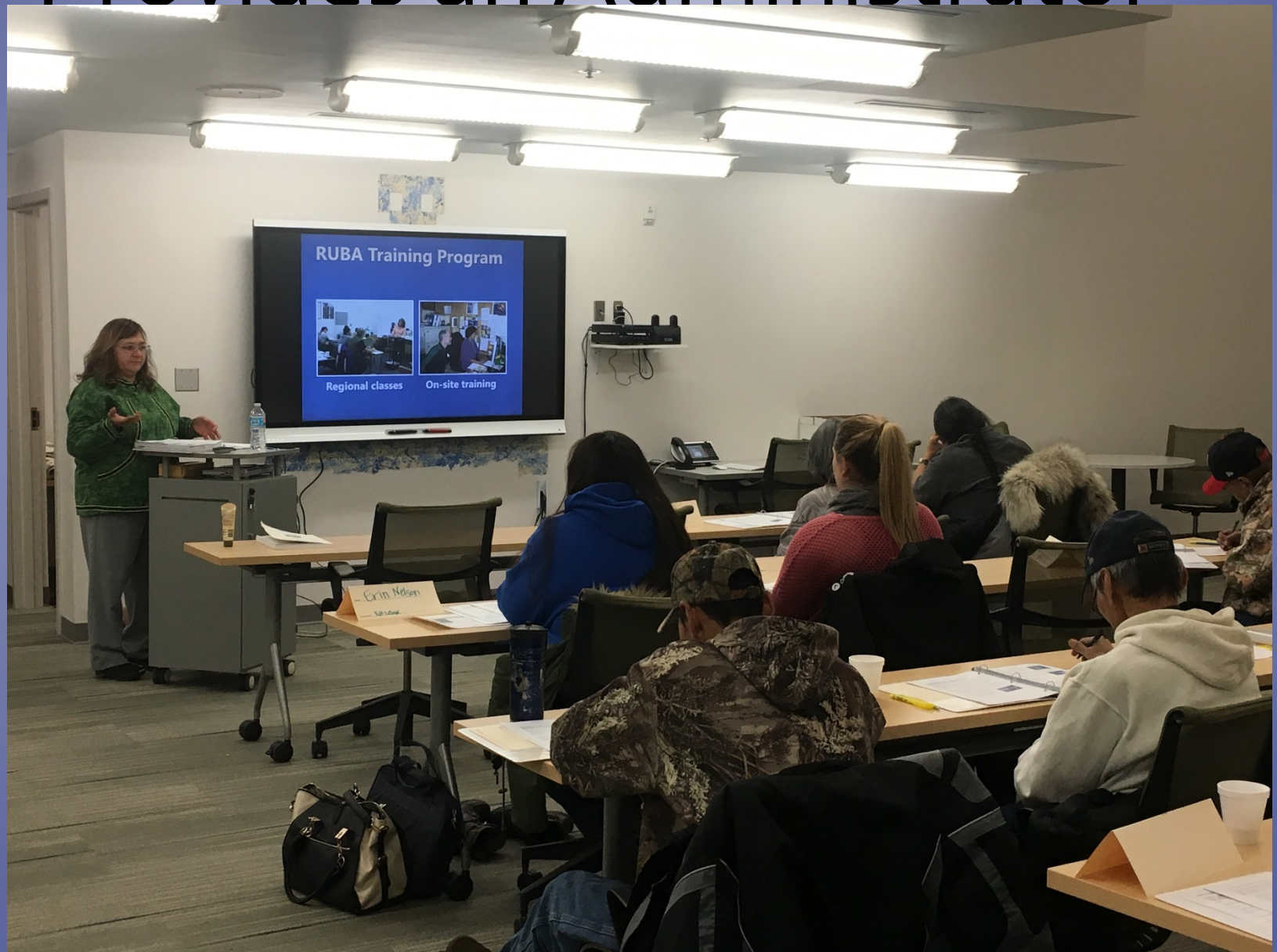
Middle row- Rochelle Cleveland, Patsy Gray, Justin Custer, Arlene Cleveland, Jallissa Kelly, Storm Woods, Zander Downey

Front row- Rihanna Greist , Jody Greist, Landen Douglas, Zaylee Williams, Anaya Dozette

Ambler 3/30/2018

Boiler training, Alaska Technical Center Center

Provides an Administrator



What about Kotzebue residents?

Kotzebue is a 2nd class city with well established billing, operations, bulk fuel purchasing and Best Practice score

- Provide direct subsidy to reduce residential bills to $125 per month
- This subsidy can only be used to reduce residential rates

Cost of proposed program

Proposed cost to Borough of $1.85 million a year

Operator labor	$980,000
Customer billing	$ 85,000
Bulk fuel	$295,000
Coordinator & training	$350,000
Kotzebue subsidy	$125,000

Future year costs should be less.

- Lower fuel cost, with bulk school purchase
- Labor and training costs decrease after repairs

Invests in local operators

Provides good pay, benefits, retirement plans and training.

Benefits **all** communities & residents

- Reduced water costs for all Borough communities
- Lower water/sewer bills for every resident

  An average of 2/3 savings
- Lower water/sewer bills for schools and businesses

  An average of ½ savings

  Piggybacks on school fuel purchase to save money
- Will attract millions in construction project grants!
  - Will increase Best Practice scores needed to get grants
  - Losing $1.5 million grant in 2019 due to low BP scores
  - Kivalina, Noatak, Selawik and Shungnak may not be eligible to apply for ½ of all grants, due to Best Practice scores.

Paul Fred Aaqaun Walton Sr, Noatak Water Plant Operator:

"I worked for the community since 1992. I dedicated my life to provide safe drinking water and sewage disposal. Funding like this is few and far between, this would greatly benefit the community. In needs like an excavator, also in heating oil, we pay the high prices, it's all flown in. Funding like this would greatly benefit the water and sewer, thank you for your work to help communities. God bless."

3/30/2018

Pulling together to keep water flowing

Conclusion

- Climate change impacts on coastal and riverine erosion and infrastructure becoming more recognized; costs in Alaska alone range from $100 million to $350 million per year.
- The ARUC has proposed an innovative approach to drinking water and sanitation utilities in the Northwest Arctic Borough.
- Alaska will have a new Governor-elect, a newly constituted 31st Alaska State Legislature, and new funding realities. Stay tuned….

Arctic Council Overview

The Ottawa Declaration
Members of the Arctic Council: Canada, the Kingdom of Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the US (8 nations)

The category of **Permanent Participant** was created to provide for active participation and full consultation with the Arctic Indigenous peoples within the Council. They are:

- the Aleut International Association
- Arctic Athabaskan Council
- Gwich'in Council International
- Inuit Circumpolar Council
- Russian Association of Indigenous Peoples of the North, Siberia, and the Far East (RAIPON) http://www.raipon.info
- Saami Council http://www.saamicouncil.net NOR/SWE/FINLAND/RUSSIAN FEDERATION

Arctic Council Leadership

Observer status in the Arctic Council is open to non-Arctic states, along with intergovernmental, inter-parliamentary, global, regional and non-governmental organizations that the Council determines can contribute to its work. 32 Observers.

Arctic Council Observers primarily contribute thorugh the Working Groups.

The Arctic is changing.

— Responsible development of the Arctic
— Health & safety (e.g. Marine shipping, tourism, OCS resource development)
— Sustainable infrastructure

The GLACIER conference Global Leadership in the Arctic: Cooperation, Innovation, Engagement and Resilience
-raised the profile of the US Dept. of State's leadership of the Arctic Council. Transfer took place in Nunavet, Canada, (April 24, 2015).

ARCTIC COUNCIL: Does the higher-level work.

Ministers become involved when decisions are made regarding the larger agreements, e.g. Search and Rescue Agreements; Dealing with spills in icy waters

Working Group Areas of Focus:

Biodiversity

Marine Environments (Shipping, Tourism, Resources)

Pollution

Emergency response, e.g. Search and Rescue

Social issues (economic and social/living conditions in Arctic communities)

- Newly added emphases on infrastructure development, presence of agencies s.a. the US Coast Guard, maritime transportation, Oil and Gas development

GENESIS the US Arctic Research Commission & the Interagency Arctic Research Policy Committee

ARCTIC RESEARCH & POLICY ACT OF 1984, AS AMENDED
PUBLIC LAW (P.L. 98-373, July 31, 1984; P.L. 101-609, Nov. 16, 1990

An Act to provide for a comprehensive national policy dealing with national research needs and objectives in the Arctic, for a National Critical Materials Council, for development of a continuing and comprehensive national materials policy, for programs necessary to carry out that policy, including Federal programs of advanced materials research and technology, and for innovation in basic materials industries, and for other purposes.

Arctic Council Overview

Arctic Council members: Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the US (8 nations)

Task Forces or expert groups are formed to carry out specific work. The Task Forces that operated during the United States Chairmanship (2015 – 2017):

- Task Force on Arctic Marine Cooperation (TFAMC)
- Task Force on Telecommunications Infrastructure in the Arctic (TFTIA)
- Task Force for Enhancing Scientific Cooperation in the Arctic

Arctic Council: Priority Areas

Arctic Council members: Canada, the Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the US.
Sr. Arctic Official (SAO) had meetings in Anchorage & Fairbanks, AK (Oct. 2015, May 2017). Lead: Ambassador David Balton, State Dept.

- **The Arctic Contaminants Action Program (ACAP)** encourages national actions to reduce emissions and other releases of pollutants.
- **The Arctic Monitoring and Assessment Program (AMAP)** monitors the Arctic environment, ecosystems and human populations, and provides scientific advice to support governments re: pollution and adverse effects of climate change.
- **The Conservation of Arctic Flora and Fauna Working Group (CAFF)** addresses the conservation of Arctic biodiversity.
- **The Emergency Prevention, Preparedness and Response Working Group (EPPR)** protects Arctic environments accidental release of pollutants/radionuclides.
- The **Protection of the Arctic Marine Environment (PAME)** Working Group is the focal point of the Arctic Council's activities related to the protection and sustainable use of the Arctic marine environment.
- The **Sustainable Development Working Group** (SDWG) works to advance sustainable development in the Arctic and to improve communities.

Arctic Economic Council

Arctic Economic Council– *New!* initiative (2014)

The Arctic Economic Council is an independent organization that facilitates Arctic business-to-business activities and responsible economic development. It is the primary forum for interaction between the Arctic Council and the wider circumpolar business community.

Working Groups:

- Maritime transportation
- Responsible resource development
- Stewardship in the Arctic (*Traditional Knowledge, Stewardship and Small/Medium Enterprise)*

Secretariat is in Tromsø, Norway. AEC terms of reference Sept. 2014 (amended at the 2nd AEC meeting, 23 April 2015

Vision on Tackling Climate Change in Alaska

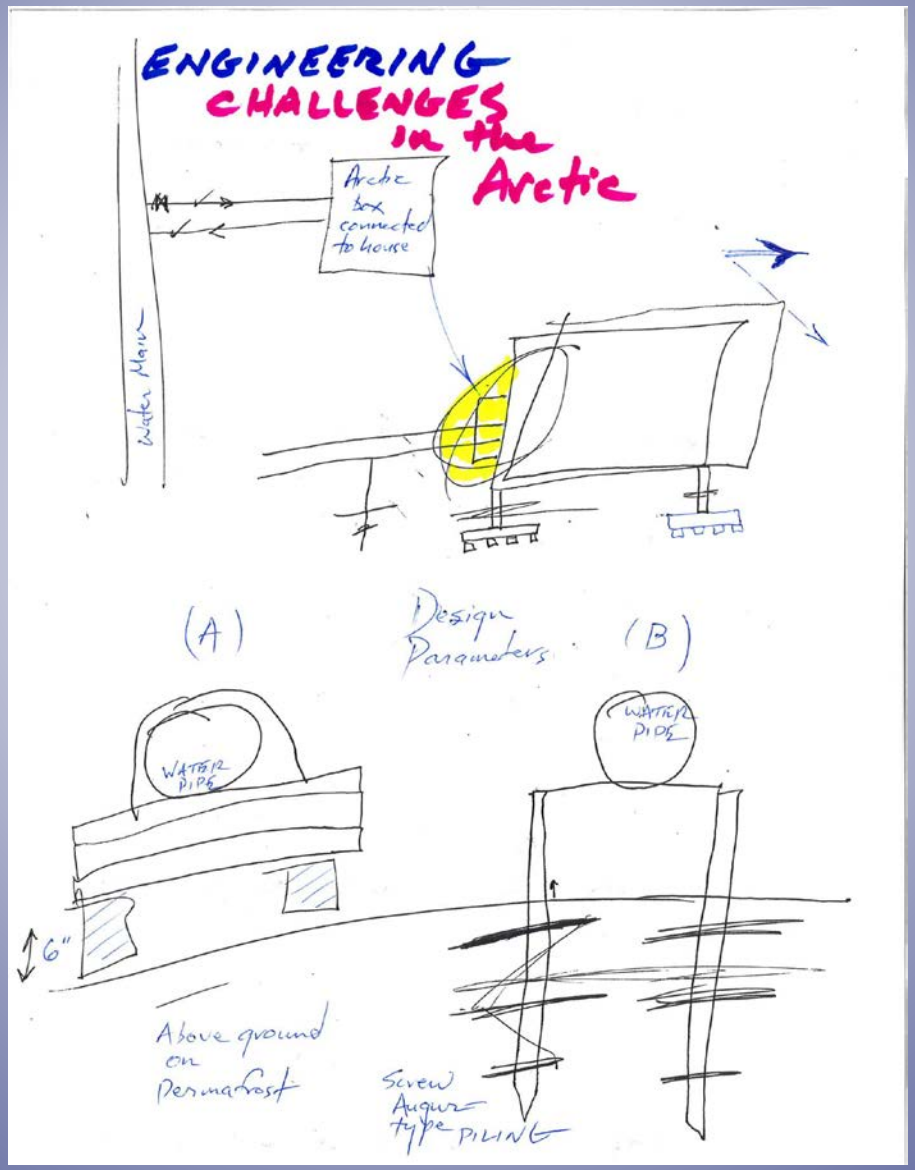
To enable policymakers to improve decision making in environment and human health, crafting **informed, fair, efficient, wise, and stable decisions**, influencing health and environment outcomes while improving the **quality of life** throughout the State of Alaska.

Through collaborative research and organized under a consortium, epidemiologists and environmental health practitioners can create new knowledge in Health and Environment while discovering pathways to invest in projects, programs and policies that have desirable outcomes in improving population health.

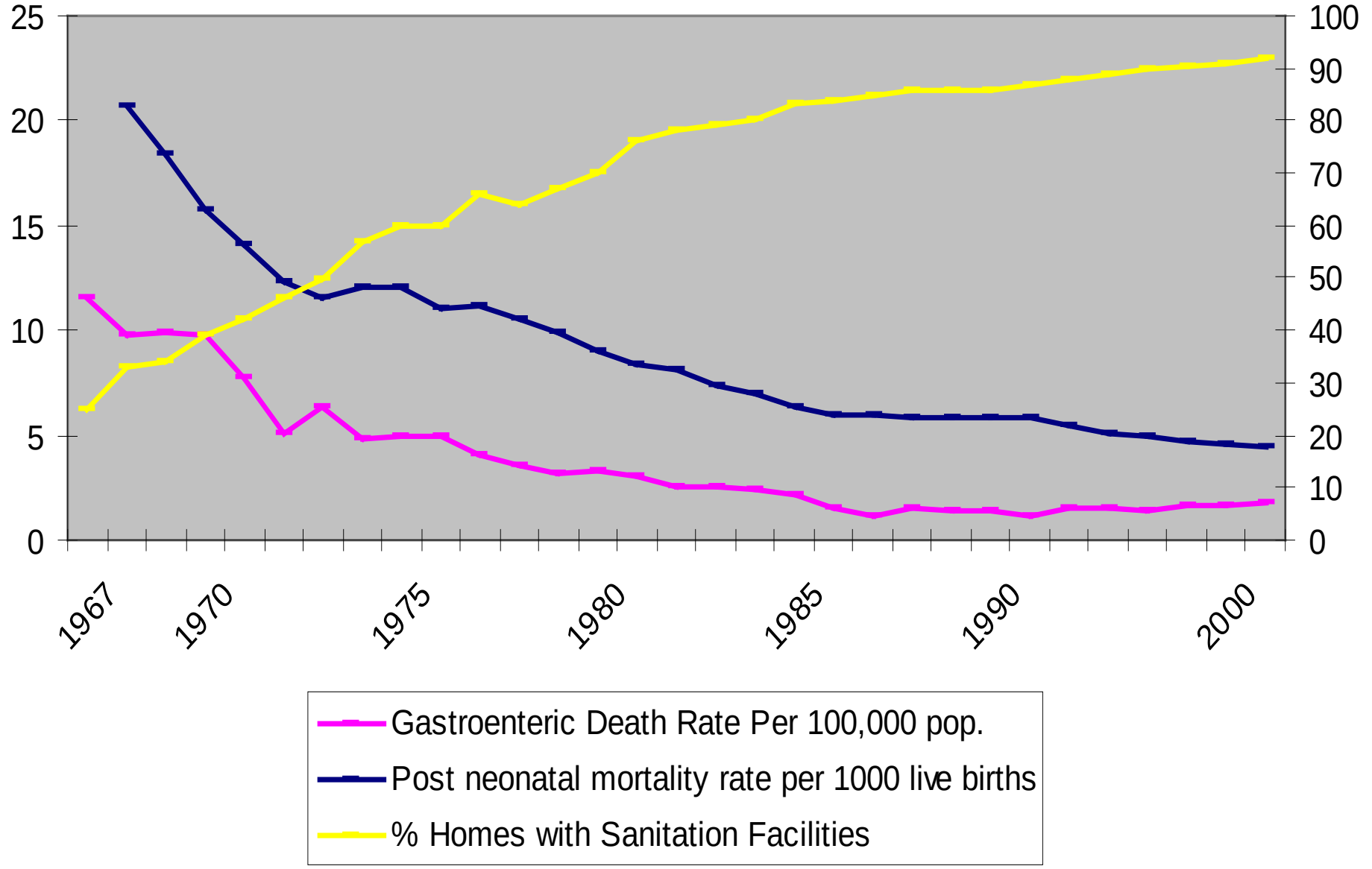
Snyder kids, Selawik, AK

(photo courtesy of Michael Brubaker, ANTHC, 2011)

Designing for Arctic Conditions



Gastrointestinal and postneonatal* mortality rates compared with percent of American Indian and Alaska Native homes having sanitation facilities



*29 days to one year of age


Current Study Area
(Northwest Arctic Borough)
ANTHC Target Area
(Entire State of Alaska)
Barrow
ARCTIC OCEAN
BEAUFORT SEA
FAR NORTH
Deadhorse
Prudhoe Bay
Kotzebue
Taylor
Pilgrim Springs
Nome
Council
Coldfoot
CANADA YUKON
Circle
INTERIOR
Fairbanks
Chena Hot Springs
Nenana
North Pole
Kantishna
Healy
Chicken
Eagle
Delta Jct.
Tok
Boundary
Bethel
Trapper Creek
Talkeetna
Wasilla
Gakona Jct.
Glennallen
Anchorage
Palmer
Chitina
Carmacks
Dillingham
Kenai
Kennicott
Naknek
Soldotna
Whittier
Valdez
McCarthy
Ross River
Destruction Bay
Seldovia
Seward
Cordova
Haines Jct.
King Salmon
Homer
Whitehorse
Carcross
Chignik
Port Lions
KODIAK ISLAND
Kodiak
SOUTHCENTRAL
Haines
Skagway
Juneau
Hoonah
Tenakee
Angoon
Sitka
Kake
Petersburg
Wrangell
INSIDE PASSAGE
Hollis
Ketchikan
Metlakatla
Prince Rupert
GULF OF ALASKA
Key
= Road
= Pipeline

Key Elements in Tackling the Challenge of Climate Change and Health

- **Research**
- **Integration of capabilities**
  - Across organizations, in government, higher education, non-governmental organizations, and in the private sector.
- **Implementation** of policies, programs, plans and projects that will lead to more sustainable communities in rural and remote Arctic Alaska
  - **more sustainable utilities** (e.g. Selawik, & Pilot Station,AK- Energy efficiency; Savoonga- Heat recovery; Kobuk-Wind energy; Mekoryuk- Wind to heat).
  - **dealing with permafrost thawing**, impacts on subsistence, housing, drinking water, sanitation, potential relocation:
    - Kivalina in Northwest Arctic Borough; Shismaref in Norton Sound

ANTHC case studies

Climate & Health Case Studies, Maniilaq Region, Northwest Arctic Borough, Alaska

Kiana, Point Hope, and Noatak

- ✧ Issues include ground subsidence, drinking water and sanitation, disposal of solid waste
- Impacts on drinking water, sanitation, and infrastructure
- Recreational and subsistence hunting unintentional injuries related to subsistence activities
- Sustainable utilities


SELAWIK

SELAWIK

- 829 residents
- Photograph below shows the location of the river; boardwalk parallel to the river
- Photograph on right shows subsidence, resulting in steep stairway
- Selawik had its water pipes freeze during the Winter of 2011/12

ANTHC case studies

Selawik, Alaska

- Infrastructure problems, permafrost thawing and riverbank erosion
- ✧ Including ground subsidence, changes in river water quality (turbidity, pollutants) and navigational hazards, more severe storms, extreme temperatures, variable seasonal weather.
- Impacts on drinking water, sanitation, & bridge infrastructure
- Recreational and subsistence hunting unintentional injuries, reduction in shore fast ice and permafrost conditions causing river changes
- Sustainable utilities, including cost of energy

Toksook Bay Alaska

Yukon-Kuskokwim Delta Region

One of the Y-K Alaska Rural Utility Cooperative success stories…

ARUC has expanded since 2008 to maritime climates.

Kivalina, Northwest Arctic Borough

374 residents, 97% Inupiat, note physical location adjacent to the Chukchi Sea (Arctic Ocean) 83 miles above the Arctic Circle RELOCATION
Traditional lifestyle revolves around subsistence, year round. $200 million (Est.)

II. Climate Change and Sustainability

Environmental Public Health Roles Who, what, why

Developing priorities to address climate change and sustainability of communities

Opportunities / challenges for future research and applications targeting the design and evaluation of environmental health interventions

“One Health”

Scientific Consensus

Global warming is ‘unequivocal’

Global effects are detectable ‘with high confidence’.

Intergovernmental Panel on Climate Change

"One Health"

- The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of lives in our present and future generations.

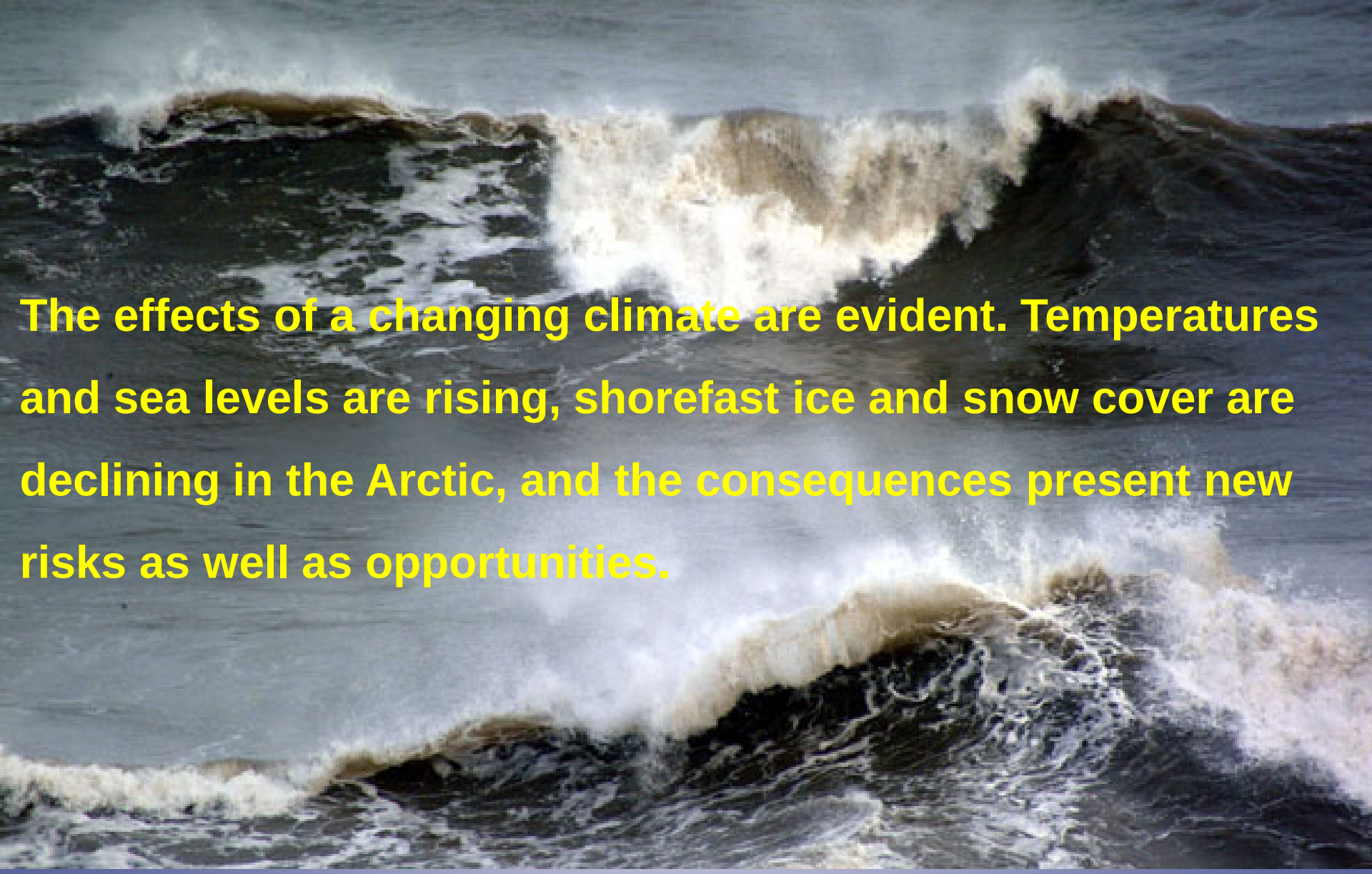
(From the website of the One Health Initiative, One World-One Medicine-One Health focus)

Conclusion

- Climate change is happening in Alaska & the Arctic.

  You don't have to have "come into the country" for it to affect you!

- We need research, integration of capabilities and capacity, and implementation of sustainable infrastructure projects.
- Innovation and technology: huge asset.
- Arctic environmental conditions are changing, challenging.
- Epidemiologists and environmental health professionals are extremely well positioned to play a key role. Sustainability builds on our competencies, strengths, energy and vision. Collaboration is essential, relationships integral.



The effects of a changing climate are evident. Temperatures and sea levels are rising, shorefast ice and snow cover are declining in the Arctic, and the consequences present new risks as well as opportunities.

Climate change – a health warning!?

INCREASES IN:

- cold related deaths
  (20,000 per yr)
- Heat related summer deaths
  (2800 per yr)
- Food insecurity
- Skin cancer
  (5000 cases per year)
- Cataracts
  (2000 per year)
- Increase in insect and water borne diseases
- Increased risk from disasters
  (Severe storms; coastal flooding; loss of shorefast ice, rising sea level due to melting glaciers, ocean acidification from absorption of carbon

Sir Liam Donaldson, CMO, DOH 2001

IPCC 5th Assessment, Polar Regions, March 31, 2014

Governance
Requires an International scope
Diplomacy is at the forefront
Administrations Make a Difference

Observations from the GLACIER Conference in April 2015, Dena'ina Convention Center, Anchorage -- Global Leadership in the Arctic: Cooperation, Innovation, Engagement and Resilience
World Congress of Epidemiology
Global Epidemiology in a Changing Environment: The Circumpolar Perspective

AJ (Tony) McMichael
Professor Emeritus (Population Health)
Australian National University, Canberra

In 2003 there was a summer heat wave in Europe – on average the temperature was 2.3 degrees C above the "norm." In Paris, in August 2003, 15,000 people, many elderly or marginalized, died!

It seems that in a "2 degree world" (above current temperatures) this would be the norm rather than the exception...

Environmental health science is a field focused on protecting people from physical, chemical, radiological, and biological threats to their health (Beck, Konkel 2003).

Environmental health practitioners work with other disciplines and colleagues to design, implement and evaluate environmental health interventions. These are aimed at creating and maintaining healthy, sustainable communities.

A "2 degree world" is highly likely – even if we manage to achieve an 80 -90% reduction in Carbon emissions by 2050. The 5th Assessment of the Intergovernmental Panel on Climate Change (IPCC) notes that every person on the planet will be affected by climate change (31 Mar. 2014).

SO - If we don't effectively control emissions we will likely see average global temperatures increase by more than 2 degrees (3˚ C? 4 degrees C?)

UNTHINKABLE

Acknowledgements

Mike Black, Director, Rural Utility Management Services, Alaska Native Tribal Health Consortium (ANTHC)

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Cruikshank Lecture & Track I Climate and Health Plenary
Dr. Tony McMichael
20th World Congress of Epidemiology (WCE 2014)
Anchorage, AK
"A Tri-Polar View of Prospects for a Warming Planet" Plenary & the Robert Cruickshank Lecture

John Nichols, Program Manager, Alaska Rural Utility Collaborative (ARUC)

Captain John Spriggs, US PHS, "Father of the ANTHC Rural Utility Cooperative," in memorium issued by the 29th Alaska Legislature, Feb. 2016

Moin Kadri, a friend for life. d. 6/8/2017

Dedicated to the twins, Britt and Kaitlin Konkel, who came into this life on Oct. 27, 1988, bringing joy and a commitment @MIT to make the planet the best one possible, to build a legacy for a healthy, sustainable future. Work worth doing. A profession with vision that cherishes challenge.

We are still all in the same boat

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Framework Appendices

Questions?

Climate Change, the Anthropocene and Human Health: Implications for Epidemiology in the 21st Century

Robert Cruickshank Lecture
World Congress of Epidemiology
Global Epidemiology in a Changing Environment: The Circumpolar Perspective

Anchorage, 2014

AJ (Tony) McMichael
Professor Emeritus (Population Health)
Australian National University
Canberra

Main Themes

- Epidemiology: continuing to evolve, as social values and public health issues change
  - Mechanistic vs. Systems-based concepts
  - Individuals vs. Populations: ‘human ecology’
  - Paradigm shifts
- The Anthropocene and Climate Change
  - Risks to Human Population Health – e.g. the Arctic
- Concepts and Methods: scope, resources
- Role and Relevance in 21st Century
  - Inputs to precautionary ‘public health’ action
  - Impact monitoring; updated projections

It is not the strongest of the species that survives,

nor the most intelligent that survives.

It is the one that is most adaptable to change that survives.

Darwin

Muncho Lake

by

Steve Konkel

UAA College of Business and Public Policy

PADM Course Offering JULY 7 – AUGUST 5, 2017

Professor Steve Konkel, Ph.D.

PADM 671 Arctic Policy, Sustainability & Governance

The Arctic is experiencing unprecedented changes in environmental conditions. In this course we explore how decision-makers are addressing threats to subsistence, food security, and sustainable utilities, while charting paths taking advantage of emerging opportunities in tourism, marine shipping, and energy.

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