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Adaptation
to Climate
Change Team

Presentation to the Canadian Water Summit

The Water-Energy Nexus in a Changing Climate

June 25, 2015

Deborah Harford, Executive Director, ACT

Water-Energy Nexus

"No water [is] available for human use without energy for extraction, cleaning, pumping, distribution, waste."

"…regardless of the electricity source – whether it is coal, nuclear, natural gas, or renewables, such as geothermal heat or concentrated solar power – all remain inextricably tied to the use of water."

POLIS 2013

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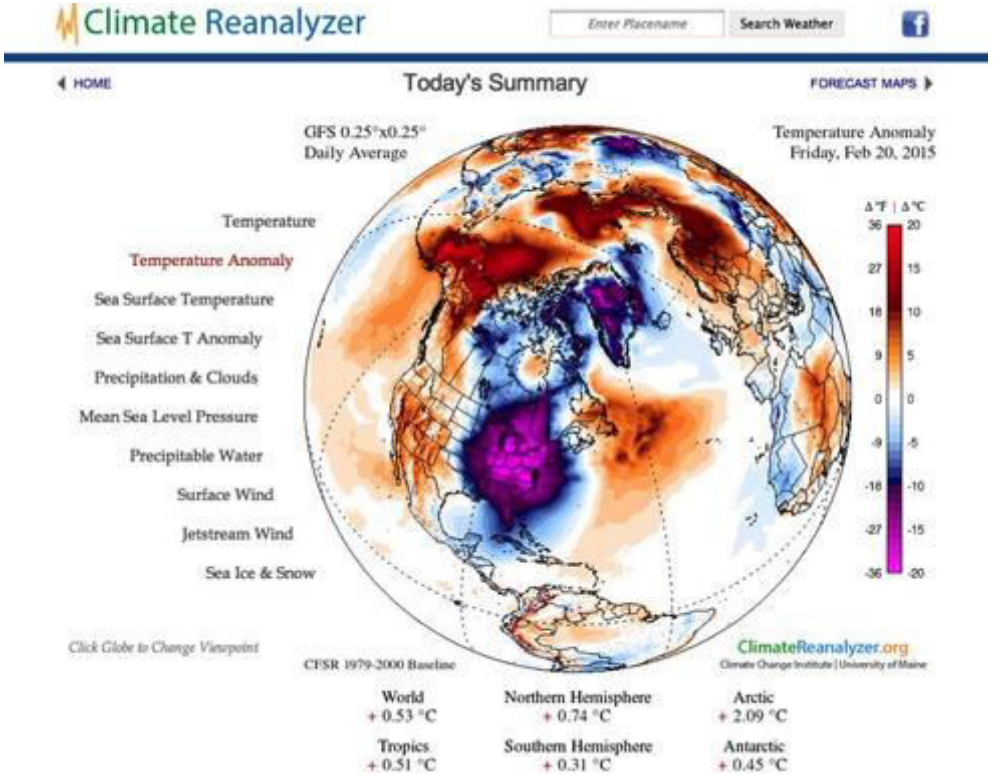
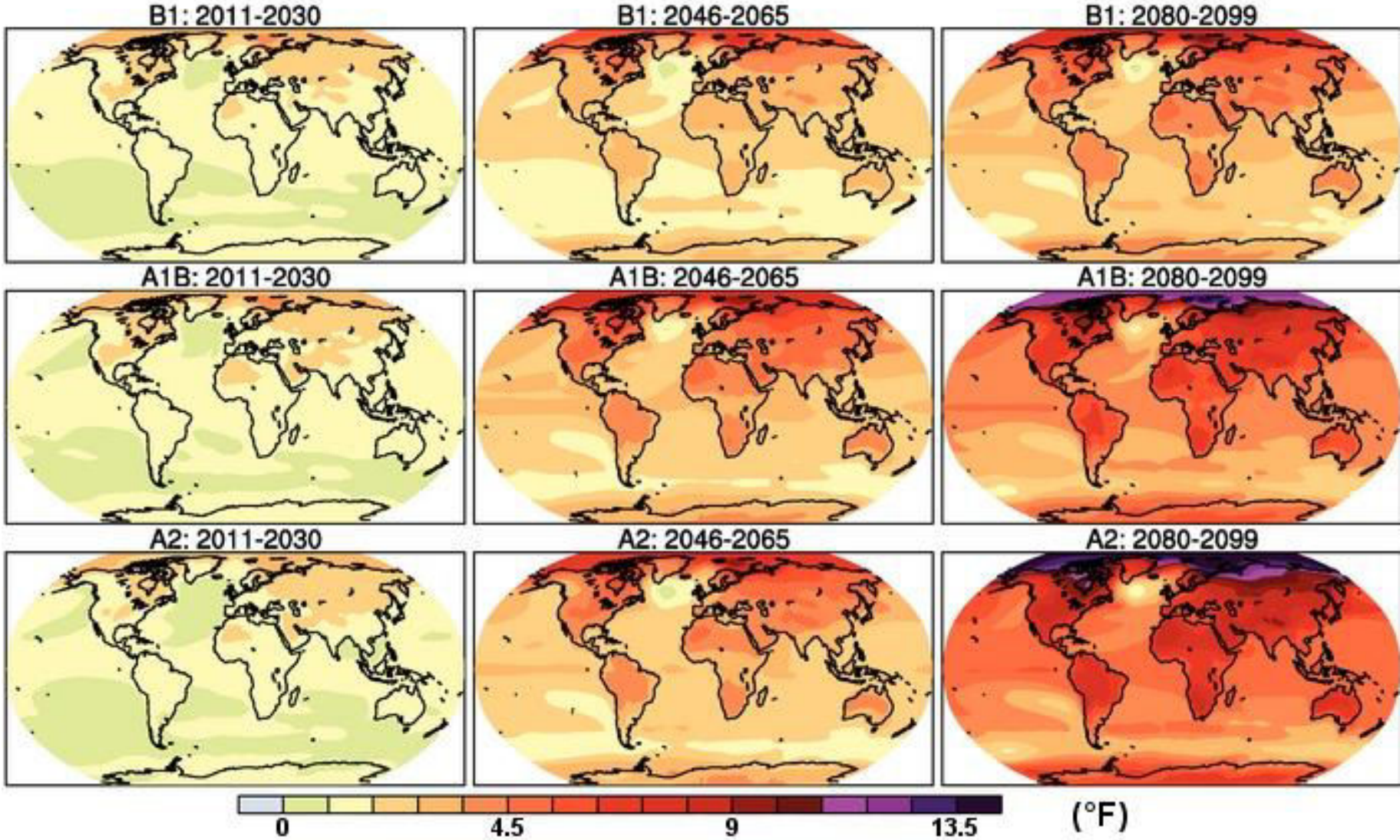
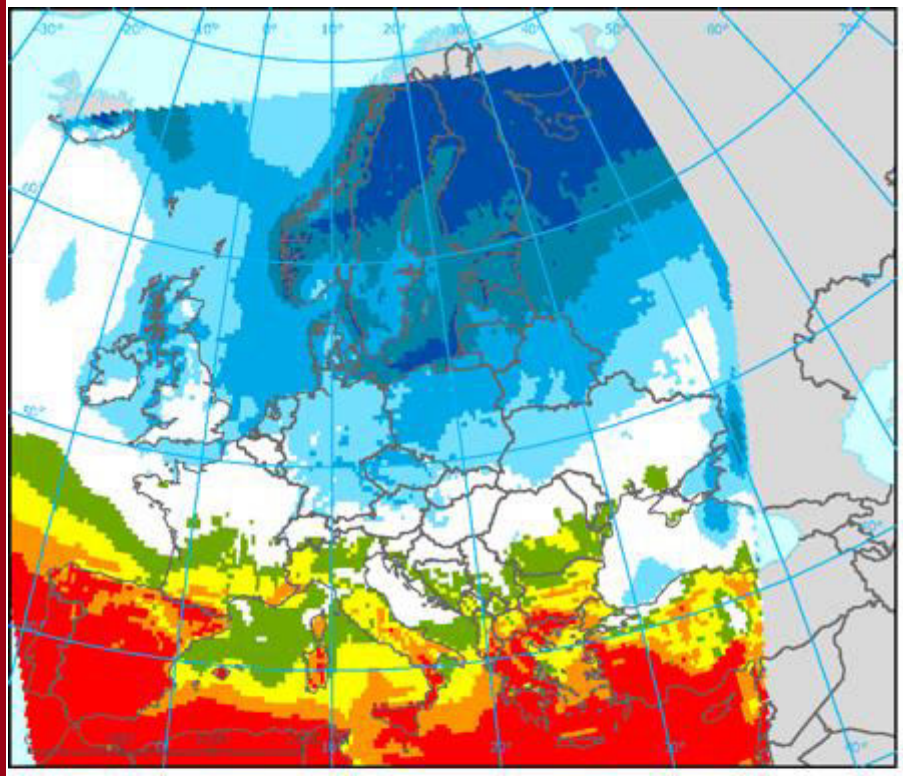
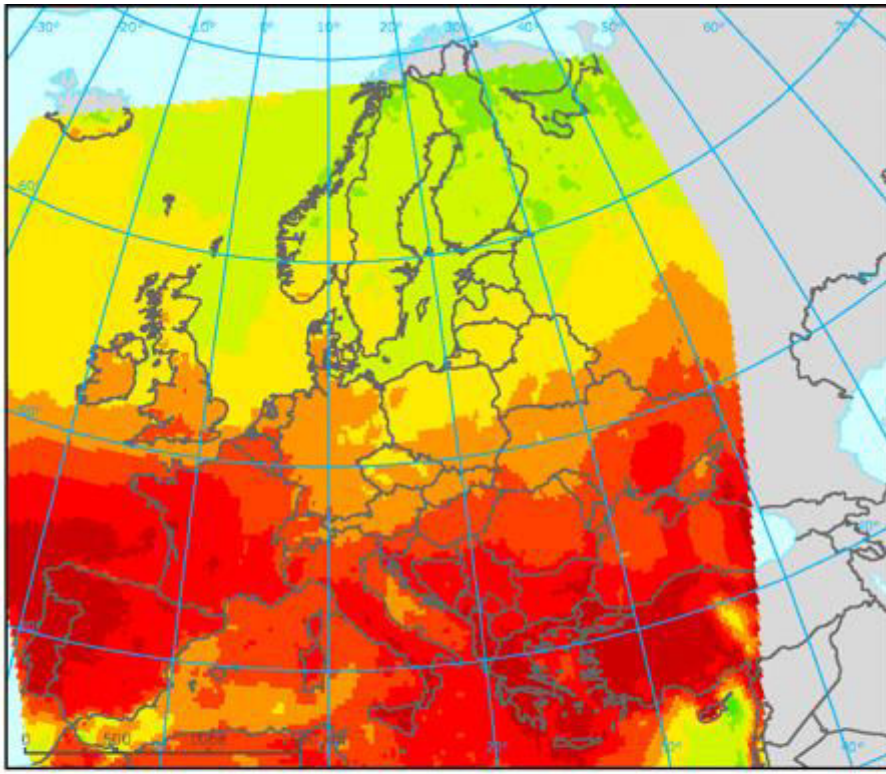


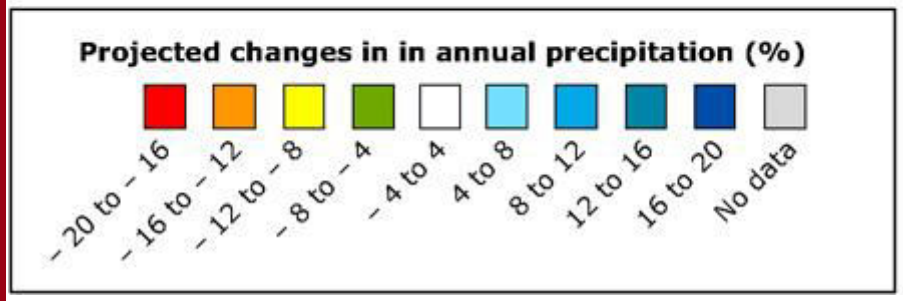
Projected Impacts: Heat



Projected Impacts: Rainfall







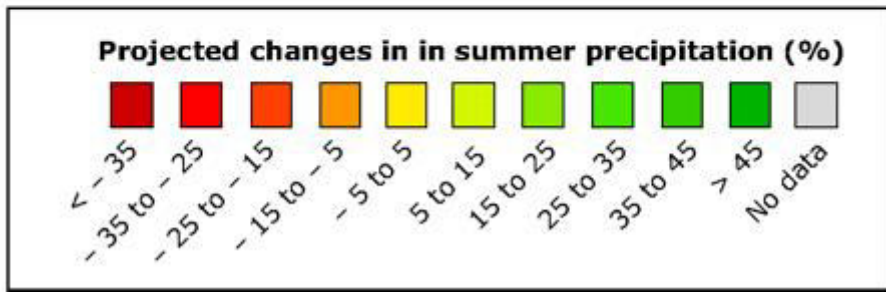


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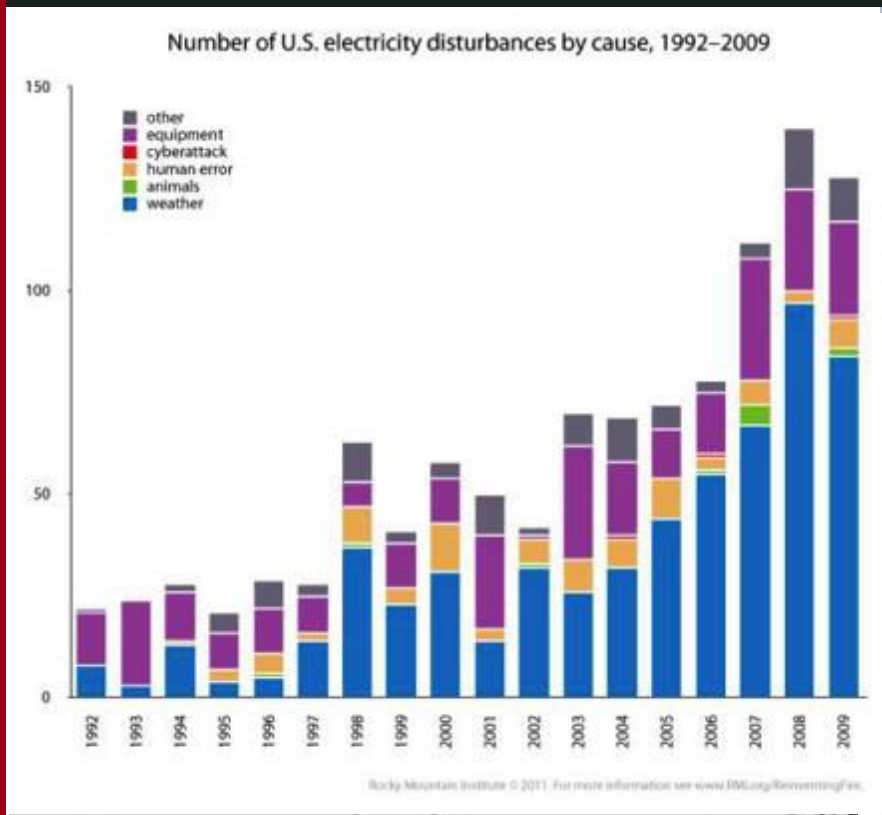
Table 1: The most costly insured natural catastrophe losses in 2013

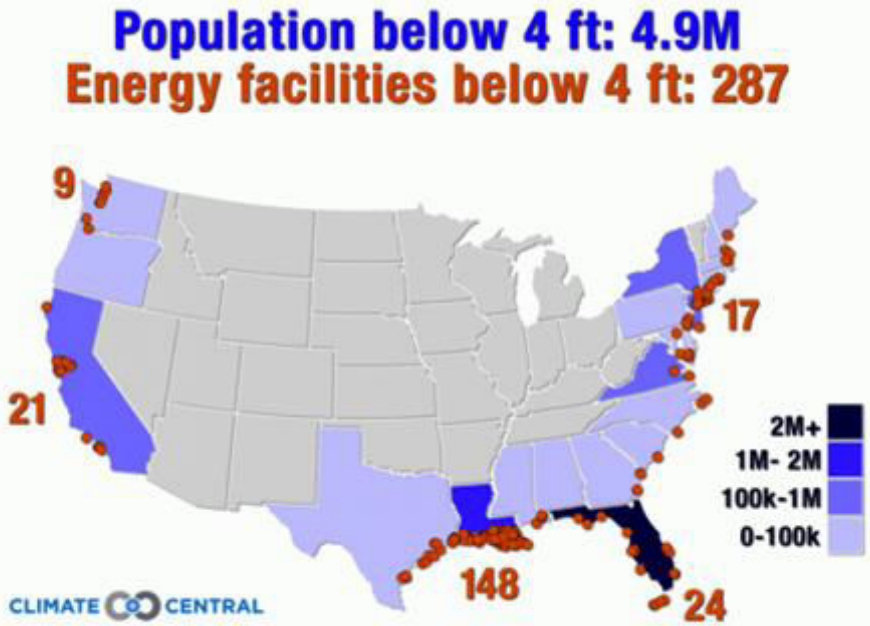
	Date (start)	Insured losses[1] (in USD bn)	Economic losses (in USD bn)	Event	Country	
1	27.05.2013	4.1	16.5	Floods	Germany, Czech Republic et al.	[2]
2	27.07.2013	3.8	4.8	Hailstorms	Germany, France	[2]
3	19.06.2013	1.9	4.7	Floods	Canada	[2]
4	18.05.2013	1.8	3.0	Severe thunderstorms, tornadoes (EF5 tornado in Moore, OK)	US	[3]
5	18.03.2013	1.6	2.2	Thunderstorms, tornadoes, hail	US	[3]
6	08.11.2013	1.5	12.5	Typhoon Haiyan	Philippines et al	[4]
7	27.10.2013	1.5	2.8	Windstorm Christian	Germany, Denmark et al.	[5]
8	28.05.2013	1.4	2.8	Severe thunderstorms, tornadoes, large hail	US	[3]
9	07.04.2013	1.2	1.6	Winter storm, ice, tornadoes, heavy rains	US	[3]
10	29.09.2013	1.1	10.3	Typhoon Fitow	China, Japan	[2]

[1] Property and business interruption, excluding liability and life insurance losses
[2] Swiss Re estimate
[3] With the permission of Property Claims Services (PCS)
[4] Philippine Insurance Commission
[5] Perils AG

"Rising temperatures are expected to lead to more frequent and severe extreme weather events in the future. If no action to reduce greenhouse gas emissions is taken, these events are likely to become an increasingly important factor in the ongoing upward trend of total losses." ~ Swiss Re, 2014

Climate-Resilient Renewables?





Projected Impacts in Canada

Extreme weather = increased severity and frequency of:

Heat waves
Drought
Wildfires
Rainfall
Ice and wind storms

Key sectors at risk from impacts:

Infrastructure
Agriculture/ecosystems
Transportation
Health
Tourism
Communications
Real estate
Energy

Projected Impacts in Canada

Changes in the cryosphere = loss of:
Permafrost
Sea ice
Lake ice
Snowpack
Glaciers

Key sectors at risk from impacts:
Northern livelihoods
Human settlements/infrastructure
Mental/cultural health
Resource based-industry
Road and marine transportation routes
Ecosystems
Tourism

Projected Impacts in Canada

Sea level rise (1.2m by 2100):
Increased storminess and storm surge
Erosion
Infrastructure impacts
Loss of beaches and coastal ecosystems
Soil salinization
River flooding

Key sectors at risk from impacts:
Real estate
Development
Insurance
Tourism
Transportation and port infrastructure
Energy
Agriculture
Coastal ecosystems

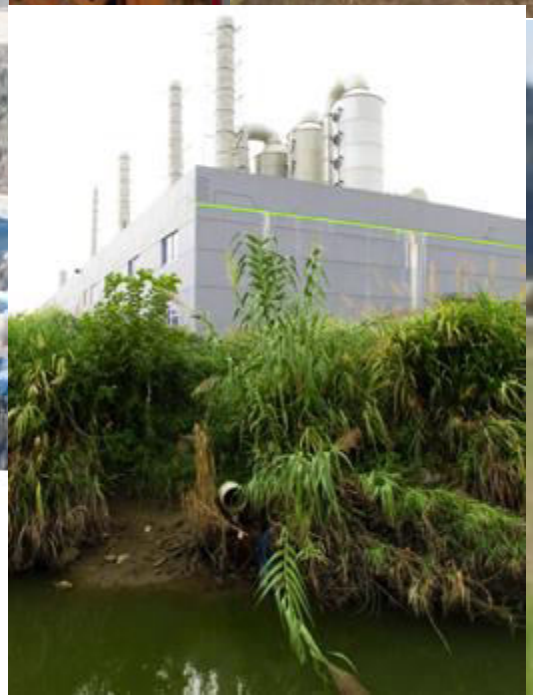
Water-Energy Nexus

"The production and supply of energy will be affected through more intense extreme weather events, water scarcity and temperature increases."
Wilbanks et al, 2008

"We need to increase the efficiency of our resource use and reduce the negative effects on our ecosystems. This will require increased energy conservation and energy efficiency on a sustained basis that has never before been achieved."
Millennium Ecosystem Assessment, 2005

Environmental Impacts: Energy & Water

Pictures of a 100 km long leak of coal mine sludge, making its way down the Athabasca River. This photo taken on Nov. 11 or 12, near the confluence of the Lesser Slave River. One billion litres of sludge leaked from the closed Obed Mountain Mine near Hinton on Oct. 31.



Plus: Sixth Mass Extinction

Vertebrates -- which include mammals, birds, reptiles, amphibians and fish -- are disappearing at a rate 114 times faster than normal.

"Avoiding a true sixth mass extinction will require rapid, greatly intensified efforts to conserve already threatened species and to alleviate pressures on their populations -- notably habitat loss, overexploitation for economic gain, and climate change ... However, the window of opportunity is rapidly closing."

(Humans are one of the species at risk.)

“Smart” Adaptation



Healthy ecosystems are a key component of climate change adaptation:

Absorb carbon
Soil retention
Clean air
Buffer against floods
Absorb moisture
Create shade for cooling
Help species cope with changes
PLUS increase property values/quality of life

Valuing Ecosystems

When decision makers undervalue the benefits we derive from nature, they underestimate the full costs to society of converting natural resources to uses that destroy or degrade natural capital.

(ACT, 2015)

Valuing Ecosystems

David Suzuki Foundation:

Nearshore Natural Capital Valuation report: **Wetlands and coastal areas = $30-$60 billion in benefits every year**.

- Natural carbon sink
- Natural protection against storms worsened by climate change/SLR.
- Habitat for declining salmon stocks.

Natural Capital in B.C.'s Lower Mainland: **Forests, fields, wetlands, waterways = $5.4 billion a year.**

Valuing Wilderness?

“A value prevails only when it outranks an existing value” ~ David Cayley

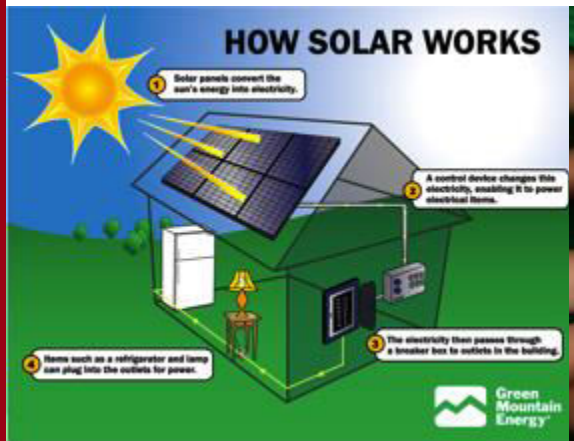
The Peace of Wild Things

When despair for the world grows in me
and I wake in the night at the least sound
in fear of what my life and my children’s lives may be,
I go and lie down where the wood drake
rests in his beauty on the water, and the great heron feeds.
I come into the peace of wild things
who do not tax their lives with forethought
of grief. I come into the presence of still water.
And I feel above me the day-blind stars
waiting with their light. For a time
I rest in the grace of the world, and am free.

Wendell Berry

Conclusions

- Design resilience to climate change (too much/too little water; extreme heat) into energy development, construction and energy forecasts.
- Establish and enforce environmentally-sound standards for energy to avoid additional impacts on aquatic & terrestrial ecosystems struggling to adapt to climate change.
- Explore ways to value ecosystem goods and services – and how to talk about, and protect, the value of wilderness.



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For more information about ACT, our policy reports, and adaptation resources, please go to:

www.sfu.ca/act

ACT thanks past and present partners:
Wilburforce Foundation, Bullitt Foundation, Zurich Canada, BC Ministry of Environment, AMEC Engineering, BC Hydro, Plutonic Power, NRCan, and the Real Estate Foundation of BC.