

Climate Change Vulnerability Assessment Support

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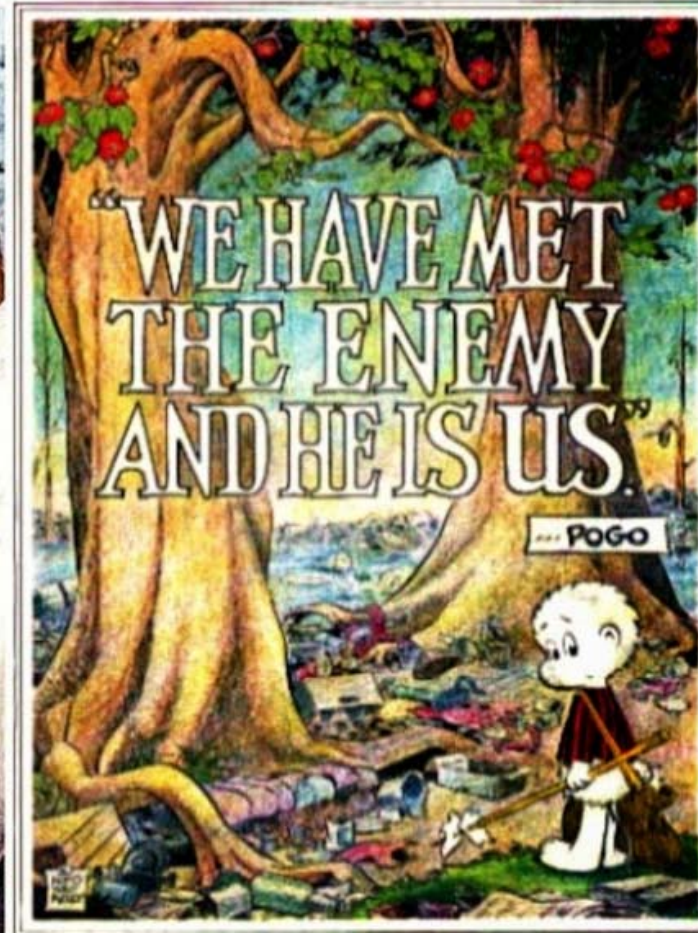
BC EIA BEST Annual Conference

Whistler, BC

Walt Kelly - Pogo

April 22, 1970

“we have
met the
enemy and
he is us”



Robert S. White, 2016 - Natural Disasters?

“...almost always it is the

- **actions**, or the
- **inactions** or
- **neglect**
- **of humans**

which turn natural processes into disasters.”

No one is as smart as everyone

depth and breadth

Climate Change Implications

- **Suffering = Impact – Mitigation – Adaptation**
- **I** impact of CC; variable; increasing; getting worse
- **M**itigation has been too little - may be too late
- **A**daptation will be chasing a moving target - worse
- **I** >> **M**, so **A** must be **massive** to limit **S**

Vulnerabilities typically considered [1]

- **Climate change** – compounding impacts
- **Not resilient infrastructure** – old, weak, undersized, designed for before change climate

Vulnerabilities sometimes missed [2]

- Not adequately prepared - Not aware / expecting;
- Prepared for the wrong scenarios ?- Over confident?
- Impacts not just local others (everyone) impacted

Vulnerability rarely considered [3]

Poor / needy - Disproportionately impacted

- more vulnerable
- less resilient
- need more help
- contribute less

Typical ER&P plans expect people will help themselves

Outline

- ISO and International
- Canada and BC
- APEGBC
- One way to conduct a Vulnerability Assessment

ISO – International Standards Organization

- **ISO 10055** – Asset Management
- **ISO 14080** – Greenhouse gas management and related activities: Guidance with framework and principles for methodologies on climate actions
- **ISO 14090** - Greenhouse Gases – Framework for adaptation to climate change

ISO – International Standards Organization

- **ISO 14091** – Climate Change Adaptation – A Guidance to Vulnerability Assessment
- **ISO 14092** – GHG Management & related activities: requirements & guidance of adaptation planning for organizations including local governments and communities
- **ISO 14097** – Framework and principles for assessing and reporting investments and financing activities related to climate change

IPCC - Intergovernmental Panel on Climate Change

2012 Adaptation and Disaster Risk Management Approaches for a Changing Climate

- Reduce exposure
- Increase resilience
- Transformation
- **Reduce Vulnerability**
- Transfer and share risks
- Prepare, respond and recover

EU CEN Guide 32 Climate Change Adaptation

EU strategy on Adaptation to Climate Change (M/526).

2014 CEN and CENELEC established the Adaptation to Climate Change Coordination Group (ACC-CG)

CEN Guide 32 Climate Change Adaptation

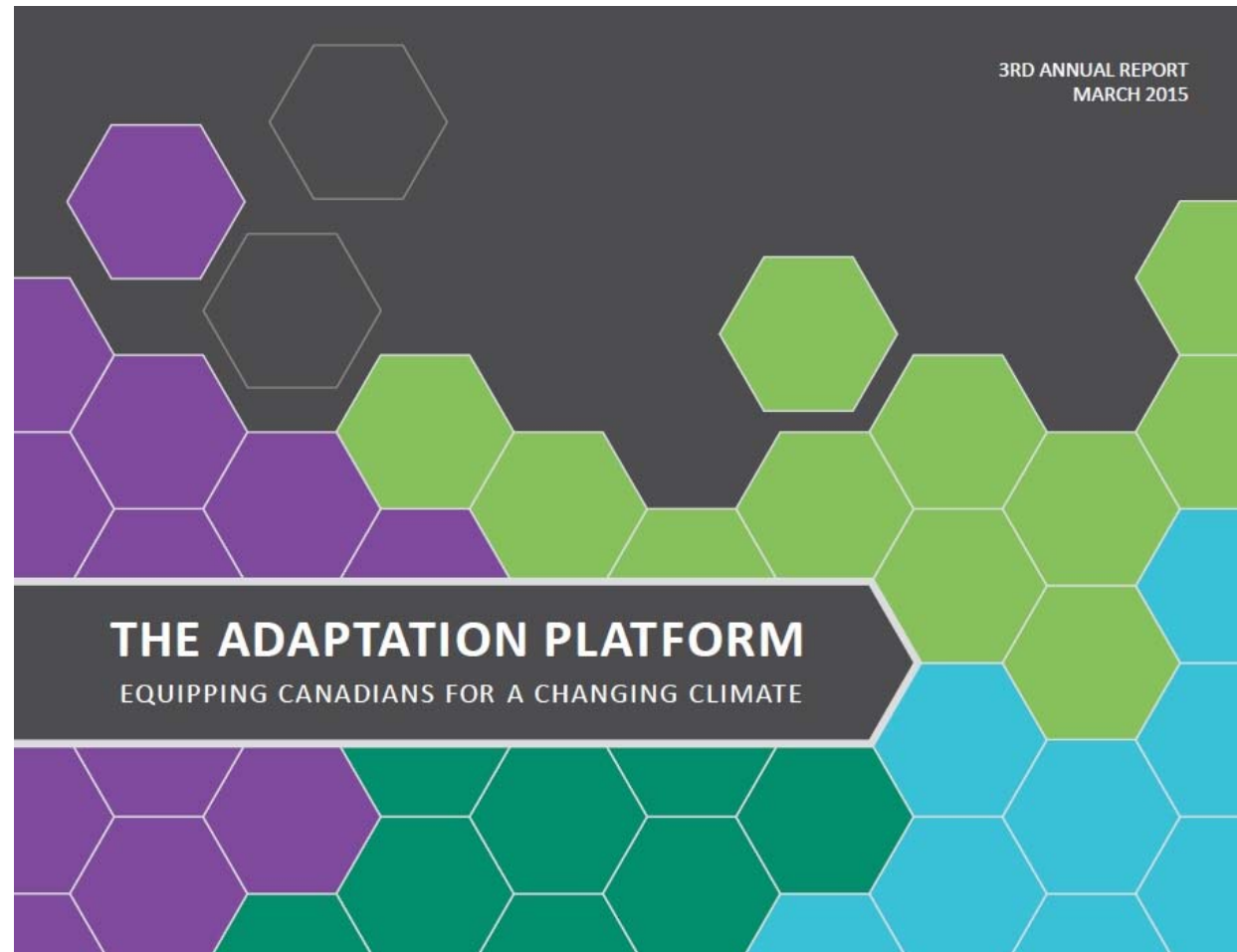
Other countries – Selected examples

- UK – e.g., Thames Estuary Asset Management (TEAM)
- Netherlands - National Adaptation Strategy 2016
 - Delta Programme 2017 <https://english.deltacommissaris.nl/delta-programme/contents/delta-programme-2017>
- US
 - FEMA - Federal Emergency Management Agency
 - NOAA – National Oceanic and Atmospheric Administration

Canadian Federal Adaptation Policy Framework

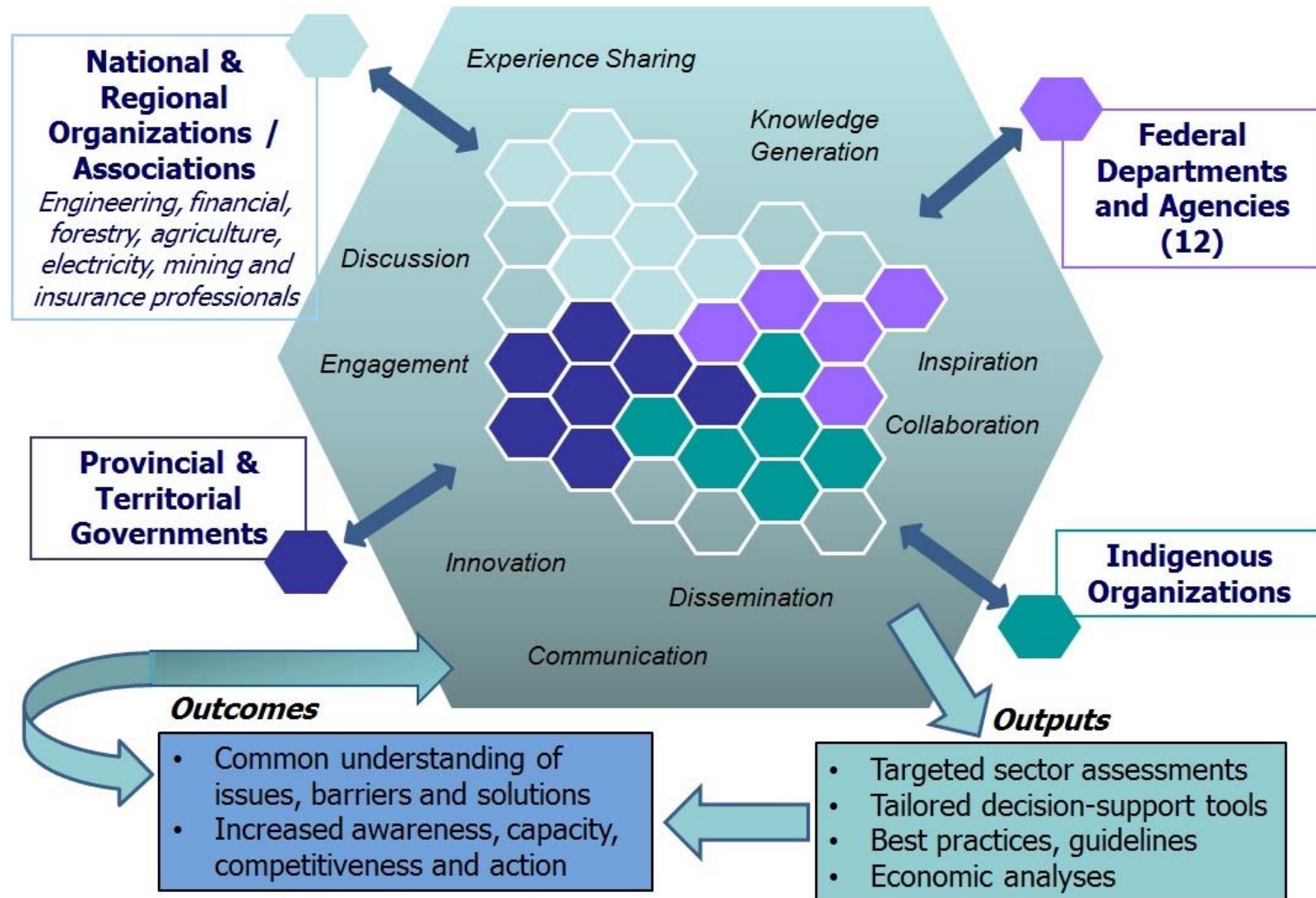
- Vision Statement
- Objectives
 - Understand relevance of CC
 - Have necessary adaptation tools
 - Resilient Federal government
- Federal Role
- Criteria for Identifying Federal Priorities

NRCan Climate Change Adaptation Platform



NRCan

Canada's Climate Change Adaptation Platform



Engineers Canada

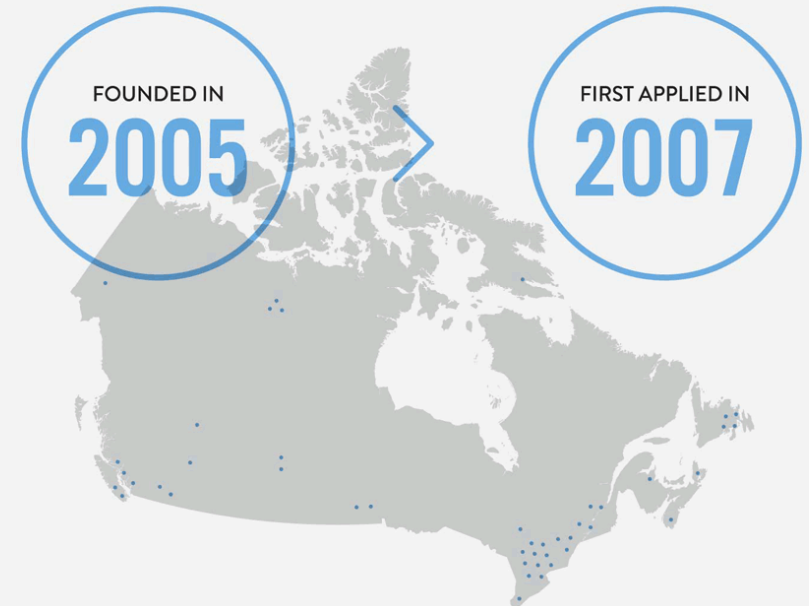
Public Infrastructure Engineering Vulnerability Committee (PIEVC)

<https://pievc.ca/>

PIEVC

PUBLIC • INFRASTRUCTURE • ENGINEERING • VULNERABILITY • COMMITTEE

The PIEVC created a protocol to assess the vulnerabilities of infrastructure to extreme weather events and future changes in climate. This enables better planning and design of safe and climate-resilient infrastructure.



The PIEVC has been applied over:

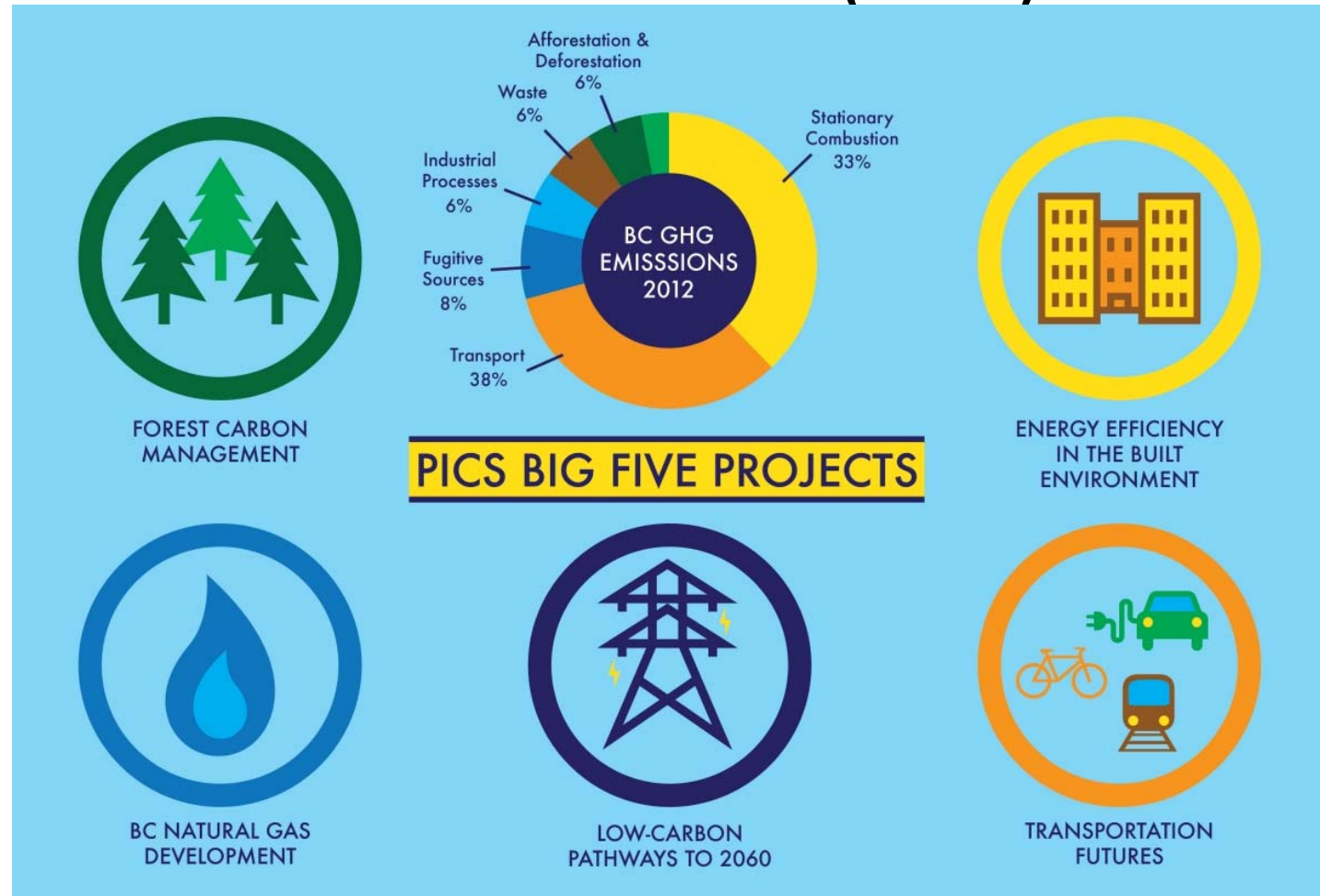
45 TIMES ACROSS CANADA
2 TIMES INTERNATIONALLY

CCME

Canadian Council of Ministers of the Environment

- IMPLEMENTATION FRAMEWORK FOR
CLIMATE CHANGE ADAPTATION PLANNING
AT A WATERSHED SCALE

Pacific Institute for Climate Solutions (PICS)



Pacific Climate Impacts Consortium (PCIC)

- <https://www.pacificclimate.org/>

Data Portal

- BC Station Data
- High Resolution PRISM Climatology 1 km resolution
- Statistically downscaled climate scenarios, including Metro Vancouver
- Station hydrologic model output – streamflow data for 120 sites
- Modelled hydrologic data for four basin

Pacific Climate Impacts Consortium (PCIC) [2]

- <https://www.pacificclimate.org/>

Tools

- PLAN2ADAPT – for those less familiar with climate modelling
- Regional Analysis Tool – for those familiar with climate modelling
- Seasonal Maps – average temperature precipitation departures from 30 year climatology

Pacific Climate Impacts Consortium (PCIC) [3]

- <https://www.pacificclimate.org/>

Resources

- Publications Library
- Software Library
- Climate Insights 101

SFU Climate Change Adaptation and Mitigation

Adaptation to Climate Change Team (ACT)

<http://act-adapt.org/community/community-organizations/>

- Resources
 - Organizations
 - Publications
 - Videos
 - Consultations
- Reports & Papers

Fraser Basin Council (FBC)

BC Regional Adaptation Collaborative Program (BC RAC)

- Community Adaptation
- Water Allocation and Use
- Coastal Flood Management
- Mining Sector Adaptation
- Energy Sector Adaptation

http://www.fraserbasin.bc.ca/ccaq_bcrac.html

BC Climate Risk Network (CRN)

APEGBC – Engineers and Geoscientists

Code of Ethics

- Safe guard public and environment
- **Fidelity** to the public
- Safety of public is **paramount**

APEGBC – Engineers and Geoscientists

Professional Practice Committee

- Guidelines
- Standards
- Technical Memos

APEGBC – Engineers and Geoscientists

Sustainability Committee

- Sustainability Guidelines
- Sustainability Primers – under development

APEGBC – Engineers and Geoscientists

Climate Change Advisory Group

- A Changing Climate in British Columbia
- Human-Induced Climate Change

APEGBC Professional Practice Guidelines –

Developing Climate Change Designs for Highway
Infrastructure in British Columbia

Ministry of Transportation and Infrastructure

Vulnerability Assessment

Proposed Approach

How to Conduct a Vulnerability Assessment [1]

- **Risk based** – start with what you know
- **Systemic approach** – step-by-step, revisit some original assumptions
- **Inclusive involvement** – avoid blind spots
- **Start shallow** – gain a understanding – ID hot spots

How to Conduct a Vulnerability Assessment [2]

- **Prioritize** – can't do everything
- **Go deeper** – how bad could it be?
- **Focus** – near-term and longer-term and perhaps next generation
- **Devise a plan** – end point of a Vulnerability Assessment

Team – as few as possible, but encompassing:

- **Natural environment** – biology, hydrology & drainage, soils & foundations
- **Built environment** – sewers & storm, water and wastewater, landfills & waste management, roads, power, communications, buildings
- **Resources** – people, services (especially emergency), equipment, materials, fuels
- **Financial – Legal - Political**

Guided tool that records results

- Modelled partly after **HAZOPs** – Hazard and Operability assessments
- Same concept used by **MOTI** – for designs
- Based on **environmental auditing** techniques
- Considering **other tools and thinking** about management or adaptation

Climate Change Scenarios

- **Typically** – precipitation, temperature and storms
- **Intensity matters** – usually more important than totals or averages
- **Combinations are critical** – and often overlooked
- **Expect the unexpected** – climate change has never happened to society – no one really knows for sure

Climate Change Impacts - Combined

- Flooding and sea level rise in winter
- Erosion, landslips, landslides with storms
- Snow and lack of snow with precipitation or no precipitation
- Drought and heat wave with high winds (dust storms)
- Wild fires and drought with high temperatures

Process [1] – Set-up Tool

- Climate change scenarios across horizontal axis – can be seasonal
- What can be impacted, including services on vertical axis – try to cover as many as possible

Process [2] – Shallow and Broad

- Start with most likely scenarios – frequency / likelihood not risk
- Quickly check off where there is likely to be an impact – maybe use low, moderate or high
- Finish-up with less likely scenarios

Process [3] – Higher Priorities and Deeper

- Briefly describe nature of scenarios and expected impact
- Identify basic next steps for specialists and less senior staff to investigate more in-depth
- Record results and follow-up in tool

Wrap-up

- Climate change can be bad - so you don't want to be surprised
- Massive global effort on climate change adaptation – including APEGBC
- Vulnerability assessments – are needed and not too difficult - if done right

Thank-You!

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