PIEVC Global Forum for Climate Vulnerability and Risk Assessments for Infrastructure

Location: Pavilion Ballroom, Sheraton Wall Centre (1000 Burrard Street), Vancouver, BC Canada

Date: April 18-20, 2023

Wi-Fi Network: Sheraton_meeting Wi-Fi Password: climate2023

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Day 1 – Tuesday April 18

8:00 – 8:30 am *Foyer*
Registration
Coffee and tea provided

8:30 – 8:45 am *Room D*
Opening Prayer and Drum
Alec Dan, *Musqueam Indian Band*

8:45 – 9:00 am *Room D*
Opening Remarks
Indigenous Leadership Initiative Sr. Advisor, Hereditary Chief Frank Brown of the Heiltsuk Nation

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9:00 – 9:30 am *Room D*
Words of Welcome
Speakers:

- Councillor Lisa Dominato, *City of Vancouver Deputy Mayor, and Chair of Metro Vancouver's Climate Action Committee*
- Mayor Mike Hurley*, City of Burnaby Mayor, and Chair of Metro Vancouver's Liquid Waste Committee*
- Honourable Bowinn Ma, *Minister of Emergency Management and Climate Readiness of British Columbia (video message)*
- Nguyen Quang Huan, *Member of Parliament, Committee of Science, Technology and Environment, Vietnam*
- Ben Hodick, *Head of Project, Enhancing Climate Services for Infrastructure Investments (CSI) · Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*

9:30 – 9:45 am *Room D*
Introduction to Global Forum
Co-Chairs Day 1

- David Lapp*, FEC, P.Eng. Fellow of Engineers Canada, Senior Advisor to the PIEVC Program*
- Darrel J. Danyluk, *P.Eng., FEC, FEIC, FCSCE, MASCE, FGC (Hon.), World Federation of Engineering Organizations (WFEO), Expert Advisor, PIEVC Alliance Associate*

9:45 – 10:30 am *Room D*
Keynote and La Academia Panamericana de Ingeniería Induction Ceremony

- Welcome and Introduction: José Domingo Pérez, *P. Eng., PAAE, PRAE, President, Pan American Academy of Engineering (PAEE)*
- Induction of Honourable Rosa Galvez, in the Pan American Academy of Engineering (PAEE)
- **Keynote** – Honourable Rosa Galvez, *Senate of Canada*

The Pan American Academy of Engineering is a private, independent, nonprofit institution of accomplished engineering professionals recognized by their outstanding contributions to engineering as a vital element for achieving progress and socio-economical sustainable development in the hemisphere and the world.

The Academy has 240 peer-elected members and associate international members, distinguished academicians, senior professionals in education, business and government who are among the hemisphere and the world's most accomplished engineers. Academicians provide the leadership and expertise for national, hemispheric and international initiatives on public policies, focused on the relationships between engineering, technology, and the quality of life, promoting the use of science and technology in solving social, economic, and environmental challenges.

As its roadmap, The Pan American Academy of Engineering adopted the 2022 San Juan Declaration, with specific action proposals for World Leaders to Plan, Design and Construct Climate Resilient Infrastructure and Commit to Mitigate and Adapt to Climate Change and Foster Engineering Education and Development.

10:30 – 11:00 am *Pavilion Ballroom Foyer*	**Morning Break** Light refreshments provided
11:00 – 12:20 pm *Room D*	**Setting the Scene: Plenary Panel Discussion** Facilitated by Darrel J. Danyluk, *World Federation of Engineering Organizations (WFEO), Expert Advisor, PIEVC Alliance Associate* Topic – Climate and infrastructure risk assessment and PIEVC in the context of national adaptation planning Panelists: • Lisa Danielson, *Senior Policy Advisor, Environment and Climate Change Canada* • Dustin Carey, *Lead, Adaptation, Federation of Canadian Municipalities* • Graeme Reed, *Senior Policy Advisor, Assembly of First Nations* • Lincoln Muniz Alves, *Researcher, National Institute for Space Research (INPE), Ministry of Science, Technology and Innovation (MCTI), Brazil*
12:20 – 1:30 pm *Room A/B*	**Lunch and Presentation** Topic – Capacity Development for PIEVC in Latin America Speakers: • Aridai Herrera, *President, Unión Panamericana de Asociaciones de Ingenieros (UPADI)* • Vladimir Naranjo Castillo, *Federated College of Engineers and Architects Costa Rica* • Erik Sparling, *Climate Risk Institute*
1:30 – 2:45 pm	**Breakout Panel Sessions** Topic – PIEVC best and emerging practice Through the sharing of best practices related to furthering infrastructure resilience, speakers and participants explore the topic of climate risk and vulnerability assessments for infrastructure from different perspectives. What can we learn from large scale applications of the PIEVC protocol? How can the PIEVC be used during different stages of the infrastructure lifecycle to inform decision-making on infrastructure resilience? And how can we move beyond pilot projects and institutionalize the use of climate risk and vulnerability assessments in infrastructure planning and operations? These are just few of the questions addressed in this session. By this, participants explore how best practices around the world can inform infrastructure practice going forward. Participants can choose between one of three parallel sessions:

Room A/B

Room 1: Lessons Learned by frequent users of the PIEVC Protocol

Facilitated by Al Douglas, *President, Climate Risk Institute*

Short description: This breakout sessions features infrastructure owners, operators, and practitioners using climate change vulnerability and risk assessment practices and related mechanisms to deliver on their climate resiliency mandates, drawing particular attention to roles for, experiences with, and observations regarding the PIEVC Protocol and Family of Resources. These speakers will provide a mix of perspectives about lessons learned as "frequent users" of the PIEVC protocol and related resources.

Panelists:

- Norman Shippee, *Senior Climate Scientist, Stantec*
- Pippa Cookson-Hills, *Climate Adaptation Specialist, City of Calgary*
- Kelby Hamilton*, Director General, Technical Services, Real Property Services, Public Services and Procurement Canada, Government of Canada*

Room C

Room 2: Using PIEVC methods in different stages of the infrastructure lifecycle

Facilitated by Eduarda Freitas, *Advisor, GIZ, Brazil*

Short description: This breakout room explores how the PIEVC can be used during different stages of the infrastructure lifecycle for risk-informed decision-making. Best practices shared include how Brazil used climate risk and vulnerability assessments to make its ports more resilient and how the First Nations Infrastructure Resilience Toolkit can assist decisions on the asset management level. It also introduces the PIEVC Catalogue of Resources. The catalogue is aimed at guiding decision makers and practitioners in navigating the growing family of PIEVC related guides and resources, choosing the right method for their needs.

Panelists:

- Joel Nodelman, *Engineer & Risk Manager, Nodelcorp*
- Uirá Cavalcante Oliveira, *Manager of Environment and Sustainability, National Waterway Transportation Agency (Antaq), Brazil*
- Elmer Lickers, *Director of Asset Management, Ontario First Nations Technical Services Corporation*

Room D

Room 3: Climate vulnerability and risk assessments in infrastructure planning and investment frameworks

Facilitated by Benjamin Hodick, *Head of Project, GIZ, Germany*

Short description: This breakout sessions delves into the question of how climate vulnerability and risk assessments for infrastructure can move beyond pilot cases and into becoming part of standard practice. Inputs from Costa Rica, Infrastructure Canada and the Nile Basin Initiative showcase different solutions that could be part of achieving this. They can be summed up as tools, incentives and capacities.

Costa Rica used the PIEVC as inspiration in an inter-institutional co-creation process to develop its own climate risk and vulnerability assessment methodology, the MERCI. With the Climate Lens, Infrastructure Canada uses financial incentives by making infrastructure resilience part of funding requirements. The Nile Basin Initiative (NBI) created a digital climate proofing hub that helps

project managers, planners, designers, and ministerial staff of its member countries to access knowledge, resources and build capacities on climate proofing of infrastructure.

Panelists:

- Nazareth Rojas Morales, *Agricultural Engineer, National Meteorological Institute (IMN) of Costa Rica*
- Francela Tencio Avila, *Meterologist, National Meteorological Institute (IMN) of Costa Rica*
- Erin Taylor, *Director, Adaptation and Resilience, Infrastructure Canada*
- Modathir Zaroug, *Regional Water Resources Modeler, Nile Basin Initiative (NBI)*

2:45 – 3:15 pm *Foyer*	**Afternoon Break** Light refreshments provided
3:15 – 4:45 pm *All*	**Station Talks** Topic – PIEVC Best Practices

The station talks session will be in the form of a marketplace to allow forum participants to familiarize themselves with different applications and versions of PIEVC in different contexts. Each station stands for one example of the wide variety of use cases. Facilitators will present their station topics and guide discussion with forum participants. Participants are encouraged to come with their own questions to the three stations they visit during this session to engage in active discussion. There will be three 30-minute rounds for participants to visit three stations of their choosing.

Station 1: Engaging small communities and unique applications of PIEVC

Clare Share, *Engineer, McElhanney*

Not all applications of the PIEVC are the same, and sometimes you need to divert from the "protocol". In this station, Clare will talk about tailoring the risk review process to the end user of the information, using a project that she is currently working on with a trail association in Alberta and the importance of leaving your pre-conceived ideas at the door and focusing on the bigger picture.

Station 2: Tailoring climate services for PIEVC applications

Elvis Asong, *Principal Scientist and CEO*, *Climalogik Inc*

Climate data and information is needed to characterize climate risks and to inform decision-making for effective risk management. However, project teams and decision makers often have to make do with limited availability of climate information and limited capacity to apply such information. Also, in the context of climate change adaptation the selection of future climate scenarios has become much richer and global climate model outputs can now be used to create regional and local climate projections. Several guides and climate data portals have been developed by National Meteorological and Hydrological Services (NMHSs) to help decision makers and information providers understand and utilize climate information required for adaptation planning. However, location-specific data availability and technical capacity challenges can hamper the tailoring of observational datasets and climate projections to support PIEVC-based risk assessments.

Typically, an initial scoping of an infrastructure climate risk assessment project will identify the climatic and hydrological variables of interest to a project. These are typically variables that guide engineering design and variables associated with hazards to a project such as peak flood discharge. An important aspect for climate risk assessment will then be the interpretation of these changes in primary meteorological and hydrological variables with respect to more complex phenomena such as floods, droughts, and changes in watershed conditions and hydrology. A PIEVC risk assessment involves defining thresholds which are crucial for determining vulnerability and risk profiles of a piece of infrastructure. Two main issues with climate data from the end users' perspective are accessibility and reliability. End users do not know which data to use, how to use it or where to find it.

This session will highlight through project case studies, key challenges associated with observed data at project sites. It will discuss best practices for filling gaps in observed data and using observed data to develop application-ready climate projections. Strategies for translating climate projections into climate hazard indices, identification of thresholds, and likelihood scoring will be elucidated. The development and delivery of next-generation, user-centered and innovation-driven data access, processing, and analytics tools will be discussed.

Station 3: PIEVC Green – using PIEVC at the intersection of "grey" and "green"

Katharina Schmidt, *Advisor, GIZ,* Dr. Niklas Baumert, *Advisor, GIZ*

There is increasing demand to take EbA, or nature-based solutions, into account when it comes to adaptation planning and infrastructure. The benefits are clear: they are often more cost effective, less invasive and serve to maintain or improve ecosystem services in a given area. However, such "green" or "grey-green" approaches are far from intuitive. How does one decide which solutions green can offer? How to properly assess and design a green-grey interconnected approach? Since all adaptation planning starts with assessing climate risks, this station talk should serve to present a systemic climate risk assessment tool for infrastructure developed by the PIEVC Alliance. The PIEVC Green allows practitioners to assess climate risks of infrastructure by taking the overall surrounding system into account. This, in turn, serves to more easily identify systems-based adaptation scenarios. The station talk will present the tool and then share the experience of its implementation in Lesotho, where it was used to assess climate risks to water dam infrastructure.

Station 4: Using PIEVC to assess large portfolio of assets

Nam Nguyen Trung, *Researcher, Southern Institute for Water Resources Planning (SIWRP, Vietnam*), Joel Nodelman, *Engineer and Risk Manager, Nodelcorp*

Often an entire portfolio of infrastructure assets is owned, operated, or under the control of a single entity. The portfolio is often widely spread geographically, and sometimes of one type, sometimes of totally different characteristics. Asset owners need to understand the distribution of prevailing climate risks for their entire portfolio before developing a deeper understanding of risks for their single asset. For providing orientation on how to assess risks for an entire portfolio of assets, the PIEVC Portfolio Scanner has been developed. It allows a relative risk sorting of assets in large infrastructure portfolios such as ports, train stations or airports, and urban infrastructure. It thereby helps to identify those assets prioritized for more detailed examination and subsequent adaptation measures. The PIEVC Large Portfolio Assessment Manual can support assessments with a range of objectives, including: 1) identifying the assets with the highest vulnerability due to climate change, 2) identifying common climate risks among common

Infrastructure archetypes, and 3) identifying common climate risks among common infrastructure elements in different climate regions.

In this station talk, the PIEVC Large Portfolio Assessment Manual will be presented before showcasing a case study application of the tool for climate risk assessments of sluice gates in Kien Giang province, Vietnam.

Station 5: Experiences adapting and applying PIEVC in First Nation communities

Elmer Lickers, *Director of Asset Management*, *Ontario First Nations Technical Services Corporation*

This session will provide an overview of the award-winning First Nations Infrastructure Resilience Toolkit (FN-iRT) and how First Nations can access the toolkit to help assess the vulnerability of their infrastructure assets due to extreme climate events. We will also provide an overview on how First Nations can integrate these climate risks into their long-term asset management planning.

Station 6: Experience with the PIEVC High-Level Screening Guide

Sarah Gaib, *Lead Geotechnical Engineer*, *BC Ministry of Transportation and Infrastructure*

In 2022, British Columbia's Ministry of Transportation and Infrastructure began the next level of climate risk assessments utilizing a new tool: the PIEVC High Level Screening Guide (PIEVC HLSG). The PIEVC HLSG applies the same processes as the PIEVC Protocol but leverages a purpose-build spreadsheet to simplify and streamline climate risk assessments.

Kersley Dale Landing Road, a site in central B.C. that was impacted by nine landslides, was used as a pilot project. The PIEVC HLSG was applied to the Kersley Dale Road Project engineering design to complete a detailed climate risk assessment.

Starting with the 14 categories of high-risk elements and five precipitation-based climate events identified in the previous PIEVC Protocols, the PIEVC HLSG was customized to reflect the context of vulnerable infrastructure at the Kersley Dale Road Project site. The PIEVC HLSG allowed the design team to better understand the risks, observations, and potential consequences at the site, allowing them to develop and report solutions to mitigate the risks. In Station 6, you will learn more about the HLSG and the case study.

Station 7: Establishing capacity building opportunities and requirements to advance practice

Harshan Radhakrishnan, *Manager, Climate Change and Sustainability Initiatives, Engineers and Geoscientists of British Columbia*

Engineers and Geoscientists BC as a regulatory body with a mandate to protect the public interest respecting the practice of the professions has Council-endorsed Climate Change Action Plan. One of its goals in the Plan to support the effective assessment and management of climate risk in the practice of professional engineering and geoscience in BC. This session will provide an overview of how EGBC is supporting capacity building efforts by delivering on key action areas of its Plan:

- Leadership and Collaboration
- Registration and Competency
- Education and Knowledge Sharing
- Practice Resources

Station 8: Climate resilience framework and standards for public sector buildings

Dominique Sigg, *Director of Climate Risk Management*, *BC Climate Action Secretariat*

The Framework and Standards builds upon leading work from provincial public sector organizations (PSOs) in British Columbia to apply a systematic and consistent approach to improve the climate resilience of public sector buildings. It applies to health authorities, school districts, post-secondary institutions, publicly funded crown corporations and agencies, and the Province for use in new and existing building projects. It includes a climate resilience framework (the Framework) for early project planning stages to develop an understanding of climate risks to a building, and to build climate resilience strategies into project design through application of minimum climate resilience standards (the Standards).

The Standards will be implemented through the Province's updated Environmental, Social and Governance Framework for Capital (ESGFC). The ESGFC establishes a requirement for taxpayer-supported capital projects to achieve climate resilience and greenhouse gas (GHG) emission reduction goals for the following public sector buildings projects:

- Construction of new or replacement facilities.
- Additions to existing buildings, and
- Major alterations to existing buildings where more than 75% of a building's fundamental components are being replaced (e.g., structural components, major mechanical or electrical systems, and/or building envelope).

The Framework and Standards were designed to be used by provincial capital ministries, PSOs (both decision makers and building managers) and their consultants for building projects within the scope of the ESGFC. The approach described for achieving climate resilience at the building level and the Standards were designed to be transferable between different building types and processes within B.C.'s PSOs. They are meant to be flexible enough to fit different types of building projects by different organizations over various timelines. Visit Station 8 to learn more.

Station 9: From building design to operation: case studies of climate risk assessments from across Canada

Lindsay Bolton, *Group Lead of Water Resources and Climate Change, CBCL*

Station 9 focuses on climate risk assessments for building operation and design. Lindsay will talk about the pros and cons of screening level vs. comprehensive analysis, the importance of good quality flood risk information to support decision making, and typical climate impacts to buildings that would be addressed in design and/or operation.

4:45 – 5:15 pm *Room D*	**Wrap up and Reflections of Day 1** Day 1 Co-Chairs and Jeanette Southwood, *Vice President, Corporate Affairs and Strategic Partnerships, Engineers Canada*
6:30 pm *Room A/B/C*	**Networking Dinner** **Keynote** – Amit Prothi, *Director General, Coalition for Disaster-Resilient Infrastructure (CDRI)* The Coalition for Disaster Resilient Infrastructure (CDRI) is a partnership of national governments, UN agencies and programmes, multilateral development banks and financing mechanisms, the

private sector, and knowledge institutions that aims to promote the resilience of new and existing infrastructure systems to climate and disaster risks in support of sustainable development. Mr. Prohti will speak to the work of CDRI and its linkages to climate risk assessment and management practices and initiatives.

Day 2 – Wednesday April 19

8:00 – 8:30 am *Pavilion Ballroom Foyer*	**Registration** Coffee and tea provided
8:30 – 8:50 am *Room D*	**Welcome to Day 2** Co-Chairs Day 2 • Harshan Radhakrishnan, *P.Eng., Manager, Climate Change and Sustainability Initiatives, Engineers and Geoscientists of British Columbia (EGBC)* • Pippa Cookson-Hills, *MSc., Climate Adaptation Specialist, City of Calgary*
8:50 – 9:10 am *Room D*	**Keynote** – Don Iveson, *Executive Advisor for Climate Investing and Community Resilience, Co-operator's & Former Mayor of Edmonton* How innovative partnerships are forming to massively scale up systemic defenses to worsening physical climate risks in our communities with disaster absorbing resilient infrastructure co-developed and co-owned by many stakeholders, including insurers and investors.
9:10 – 10:45 am *Room D*	**Plenary Panel Discussion** Facilitated by David Lapp*, Senior Advisor to the PIEVC Program* Topic – Meeting the emerging and future needs for climate change vulnerability and risk assessment Panelists: • Catherine Lafleur, *Manager, Infrastructure Canada* • Trevor Murdock, *Climate Scientist, Canadian Centre for Climate Services, Environment and Climate Change Canada* • Robin Cox, *Professor, Royal Roads University, Director, Resilience-by-Design Lab* • Patrick Michell, *Former Chief, Kanaka Bar Indian Band* • Vladimir Naranjo Castillo, *Head of Climate Change Directorate, Federated College of Engineers and Architects of Costa Rica (CFIA)*
10:45 – 11:15 am *Foyer*	**Morning Break** Light refreshments provided
11:15 – 12:00 pm	**Practitioners Panel [Fishbowl]** Topic – Vision for the PIEVC and the PIEVC Practitioners' Network In this session, we will hear different perspectives about the needs for climate vulnerability and risk assessment, and resilience the PIEVC Program and the PIEVC Practitioners' Network. The Fishbowl panel setting will not only allow the pre-identified panelists but all participants of the Forum to join in on the discussion and share their perspectives. The fishbowl format leaves some

	seats on the panel open for members of the audience to join in. Among the questions discussed will be what are the needs of infrastructure practitioners in terms of resources, capacities and assistance and how the PIEVC Program and Practitioners' Network could support in meeting those needs. The session includes 2 parallel panels to cover the perspectives of different kinds of users of the PIEVC.
Room A/B/C	**Panel 1:** Perspectives from infrastructure owners and operators Panelists: • Bryan Crosby, *District Operations Manager*, *BC Ministry of Transportation and Infrastructure* • Brent Burton, *Division Manager, Liquid Waste Services, Policy, Planning, and Analysis Division, Metro Vancouver* • Matt Delorme, *Executive Director, Atlantic Infrastructure Management (AIM) Network*
Room D	**Panel 2:** Perspectives of Government and policy users of PIEVC Panelists: • Ana Paula Higa, *Economist and Regulation Specialist, Brazil National Agency of Waterway Transportation (ANTAQ)* • Harshan Radhakrishnan, *Manager, Climate Change and Sustainability Initiatives, EGBC* • Amanda Broad, *Manager of Disaster Mitigation and Adaptation Polic, BC Emergency Management and Climate Readiness*
12:00 – 1:00 pm *Room A/B/C*	**Lunch and Presentation –** Technical Assistance Partnership-Expert Deployment Mechanism Speakers: • Ritesh Sardjoe, *Ministry of Spatial Planning and Environment, Suriname* • Gabrielle Lepage, *President, Alinea International* • Erik Sparling, *Climate Risk Institute* The Technical Assistance Partnership (TAP) is part of Global Affairs Canada's (GAC) Expert Deployment Mechanism (EDM) approach to official development assistance. TAP-EDM brings leaders from a diversity of sectors, backgrounds, gender, cultural identities and regions across Canada to share their expertise with partner countries around the world.
1:00 – 1:20 pm *Room D*	**Indigenous Climate Atlas** Speakers: • Ian Mauro, *Executive Director, Pacific Institute for Climate Solutions* • Brett Huson, *Researcher, Prairie Climate Centre*
1:20 – 1:35 pm *Room D*	**PIEVC Alliance Strategic Directions** Speakers: • Dan Sandink, *Director of Research*, *Institute for Catastrophic Loss Reduction* • Ben Hodick, *Head of Global Project Enhancing Climate Services for Infrastructure Investments (CSI)*, *GIZ* • Erik Sparling, *Vice President*, *Climate Risk Institute* • Elmer Lickers, *Director of Asset Management*, *Ontario First Nations Technical Services Corporation* • Vladimir Naranjo Castillo, *Head of Climate Change Directorate, Federated College of Engineers and Architects of Costa Rica (CFIA)*

1:35 – 1:40 pm *Room D*	**Introduction to Afternoon Session**
1:40 – 3:00 pm All	**World Café** The objective of the World Café is for participants to engage in discussions to help identify and elaborate ways in which the PIEVC Program can better support key user groups conduct climate change vulnerability and risk assessments and plan, design, operate, and manage climate resilient systems. The World Café will involve three rounds, each approximately 30 minutes, where participants cycle through **three** tables of their choosing. There will be 9 different tables, each focusing on a different aspect of advancing the PIEVC program and Practitioners' Network. At each table, a facilitator will present the topic and guiding questions, and participants will have the opportunity to elaborate on ideas based on their experience and expertise. When they arrive at their next discussion table, each new group of participants will be briefed on the results of all prior discussion. They will then be engaged to help advance specific ideas - provided by the earlier group(s) or the new set of discussants - for how the PIEVC Program and Practitioners' Network can better support activities related to the theme of the table. Participants will sign up for three tables of their choosing on Tuesday. Participant table and round assignments will be posted around the venue on Wednesday before the World Café. **Table 1: Advancing the use of PIEVC methods for building sector CCVRAs** Facilitated by David Lapp*, Senior Advisor to the PIEVC Program* and Charling Li, *Green Building Engineer, City of Vancouver* Increasingly, the owners and managers of *buildings* need to better understand how well these assets will perform in the changing climate. They need to be able to assess related risks and identify, evaluate, and implement measures to improve resiliency routinely and effectively. Experience using PIEVC-based approaches to assess buildings for climate change-related vulnerabilities and risks has rapidly increased over recent years. **THIS WORLD CAFE TABLE** will (1) take stock of experiences to date using PIEVC-related approaches for CCVRAs of buildings; (2) identify and discuss needs and opportunities to more effectively support CCVRAs of buildings; and (3) indicate what the PIEVC Program and Practitioners Network might best do to help meet key needs and seize key opportunities. **Table 2: Private financing for resilient infrastructure** Facilitated by Don Iveson, *Co-Operators,* and Paul Manias, *Addenda Capital* *Sponsored by Co-Operators* The impact of climate change is exacerbating the challenges faced by current infrastructure. Innovations are required to the design, procurement, and financing of new climate resilient infrastructure. Despite the economic case, funding for resilience projects is constrained and there are many competing pressures facing Canadian communities. It is simply not realistic for taxpayers to carry the full financial burden of building a resilient Canada at the scale and with the urgency required, especially when there are a variety of benefits and cost avoidances that are

intuitively present by difficult to model, quantify and harness to make more projects financially viable.

THIS WORLD CAFE TABLE will introduce the concept of private resilience infrastructure investment to the PIEVC community and identify jointly opportunities for innovation in the design, procurement, and financing of new, rehabilitated, and replacement climate resilient infrastructure.

Table 3: Risk treatment and the PIEVC process

Facilitated by Twyla Kowalczyk, *Associated Engineering,* and Pablo Borges, *GIZ*

Typically, the scope of PIEVC assessment studies has been limited to identification of vulnerabilities, and initial recommendations based on vulnerability assessments. There is increased interest, however, to develop, assess, select, and implement, monitor, and evaluate risk treatment options. Furthermore, within the last 5-10 years, numerous national and international standards and guides concerning climate resilience have been developed and are available for application. New guides and standards focus on risk reduction options for a variety of climate related perils.

THIS WORLD CAFE TABLE will explore what more can be done through the PIEVC program to provide guidance on and otherwise advance risk treatment practice.

Table 4: Ways to improve and expedite PIEVC applications

Facilitated by Joel and Joan Nodelman, *Nodelcorp,* Trevor Murdock, *Environmental and Climate Change Canada,* Norm Shippee, *Stantec*

In practice, proper use of the PIEVC Protocol and Family of Resources can require significant experience and skill; to appropriately scope the assessment, tailor methods to match the scope and objectives, access and customize climate and infrastructure data, and facilitate deliberations and interactions among experts and stakeholders throughout the process. PIEVC assessments can be improved through use of certain decision-support and facilitation tools that expedite the process and help ensure quality compliance.

THIS WORLD CAFE TABLE will share experience with bottlenecks in effective and efficient PIEVC application and focus on jointly identifying and scoping potential decision-support and facilitation tools, and on identifying those that could be most usefully advanced by the PIEVC Program to expedite and improve PIEVC applications.

Table 5: Building the practitioner base to support infrastructure and climate change risk assessments and adaptation planning

Facilitated by Kirsten MacMillan, *Climate Risk Institute,* and Isabelle Charron, *Ouranos*

There is growing demand for professionals trained and experienced in climate change and infrastructure vulnerability and risk assessment, adaptation planning, and resilience. Calls for "upskilling" the workforce to meet this growing demand are increasingly prevalent.

THIS WORLD CAFE TABLE will (1) gather perspectives on the status of capacity-building programs (education, training, mentoring, peer-to-peer support, etc.) required to significantly increase the number of well-prepared infrastructure and climate change vulnerability and risk assessment

practitioners; (2) identify and discuss the best opportunities to more effectively grow the practitioner base; and, (3) determine what the PIEVC Program and Practitioners Network might best do to help meet certain key needs, and capitalize on any especially important opportunities.

Table 6: Supporting small and under resourced communities

Matt Delorme*, Atlantic Infrastructure Management Network,* and Katharina Schmidt, *GIZ*

Communities with smaller populations have limited staff, financial resources, and access to engineering expertise. However, because of their smaller size, they generally have a good intuitive sense of what is at risk and what is a concern to the community. Unique challenges and opportunities in smaller communities include (a) Translating climate concerns into formal assessments that support access to public infrastructure funding; (b) the role of training and high-level assessments in municipalities with less than 5 staff that cannot hire consultants; (c) blending vulnerability and aging infrastructure assessments, understanding realistic budgeting for aging, and vulnerable infrastructure; and (d) opportunities to pool resources, expertise, and data to assess vulnerability, at regional scales.

THIS WORLD CAFE TABLE will establish a baseline understanding of the challenges and needs of small and remote communities with respect to assessing climate change vulnerability in the built environment.

Table 7: Supporting and building resilient Indigenous communities

Elmer Lickers*, OFNTSC,* Shayka Sur, *OFNTSC*, Brett Huson, *Prairie Climate Centre,* Ian Mauro, *Pacific Institute for Climate Solutions*

The First Nations Infrastructure Resilient Toolkit (FN-iRT) identifies climate change impacts on community infrastructure design and operation using a streamlined First Nations PIEVC approach. This FN-PIEVC is the first tool to incorporate existing First Nations data into climate risk assessment processes and allows First Nations to integrate climate related risks into asset management plans, allowing them to better manage the full life cycle of their infrastructure. The Indigenous Climate Atlas, co-developed with the Indigenous communities and organizations, presents climate data for all 634 First Nations communities across the country. By combining science and storytelling, the Indigenous Climate Atlas supports the FN-iRT and other risk assessment processes.

THIS WORLD CAFE TABLE aims to identify and discuss approaches how the FN-PIEVC or FN-iRT can provide best significant benefits to First Nation communities and supporting groups and how the tool kit can assist First Nations – and practitioners that might support First Nation communities – in assessing climate and infrastructure risks holistically across local culture, ecosystems and built environments. Feedback is gathered on how these tools can be beneficial to First Nation communities.

Table 8: Assessing the risk and resilience of BC's critical infrastructure

Facilitated by Amanda Broad, Melissa LeGeyt, *BC Emergency Management and Climate Readiness,* and Dominique Sigg, *BC Climate Action Secretariate*

In December 2022, the Ministry of Environment and Climate Change Strategy's Climate Action Secretariat and Ministry of Emergency Management and Climate Readiness received a joint mandate to develop a Disaster and Climate Risk and Resilience Assessment, anticipated for

release in June 2024. The assessment will be co-developed with Indigenous partners and informed by engagement with local authorities, critical infrastructure operators, and other key provincial parties. The first stage of the assessment will be completed for provincially-significant risks and resilience opportunities, followed by regional-level assessments from 2024 – 2026. A scalable framework is being developed for risk and resilience assessments in BC, as well as a list of priority hazards. Critical infrastructure will be a key part of these assessments.

THIS WORLD CAFE TABLE will (1) verify priority hazards for critical infrastructure in BC; (2) gather perspectives on what is feasible and recommended for a provincial-level risk and resilience assessment by in one year; and (3) identify specific ways PIEVC can be integrated into a scalable framework.

Table 9: Role of Standards

Facilitated by Brady Allin and Kala Pendakur, *Standards Council of Canada*

Infrastructure owners and designers need to account for climate change in the design, construction and retrofit of buildings and infrastructure. The PIEVC protocol provides a comprehensive framework to assess the vulnerability of infrastructure against climate change and is a leading tool in doing so. Parallel to PIEVC is a significant effort by the national and international standardization and accreditation systems to produce guidance, requirements and systems to develop new standards, update existing standards, and to provide assurance these are being following to build climate resilience. These tools can be used to both support and increase adoption of PIEVC.

THIS WORLD CAFÉ TABLE will (1) identify needs and opportunities to leverage the standardization system to build further guidance to both support the application of PIEVC to unique asset classes and the acceptance of PIEVC assessment results, and (2) discuss how the PIEVC protocol can be better linked with existing climate adaptation and resilience tools (standards, guidance) that are required to address identified needs following an assessment.

3:00 – 3:30 pm *Foyer*	**Afternoon Break** Light refreshments provided
3:30 – 4:30 pm *All*	**World Café Continued**
4:30 – 5:00 pm *Room D*	**Wrap up and Closing Remarks** Co-Chairs Day 2 and PIEVC Alliance
5:00 pm *Room D*	**Closing Prayer and Drum** Alec Dan, *Musqueam Indian Band*

Day 3 – Thursday April 20

9:00 – 2:00 pm **Study Tours**

Please note: You must have registered in advance to join a study tour. Each tour will vary in length and distance but will last approximately 3-4 hours (including lunch) and will end early afternoon. Each tour will cover 2-4.5 km of distance by foot or other means.

Iona Wastewater Treatment Plant (Metro Vancouver)
Meet in the lobby of the Sheraton Wall Centre at 8:30 am, bus leaves at 9:00 am.

A tour of Metro Vancouver's Iona Wastewater Treatment Plant and Iona Regional Park restoration projects. Learn more about the 2008 PIEVC study conducted on the plant and the current upgrades taking place.

Olympic Village Green Infrastructure Walking Tour (City of Vancouver)
Meet in the lobby of the Sheraton Wall Centre at 9:00 am.

A City of Vancouver Green Infrastructure walking tour of Olympic Village. Learn more about how the city is integrating blue-green systems into the built environment and addressing sea level rise.

Speaker and Panelist Bios

Lincoln Alves, *Climate Researcher, National Institute for Space Research (INPE), Brazil*
Day 1 Panelist "Climate and infrastructure risk assessment and PIEVC in the context of national adaptation planning" – 11:00 – 12:20 pm

Lincoln Alves is climate researcher at the National Institute for Space Research (INPE), Brazil. Lead Author of Atlas of the IPCC Sixth Assessment Report (AR6-WG1), Contributing Author of Amazon Assessment Report 2021 of the Science Panel for the Amazon (SPA), Member of the Brazilian Panel on Climate Change (PBMC), Member of the WMO Regional Association III Working Group on Science and Research and the Coupled Model Intercomparison Project (CMIP7) Data Access Task Team led by the World Climate Research Programme (WCRP). He is responsible for providing technical and scientific information quality to guide public policies for adaptation to regional environmental changes. His areas of expertise include Earth System Science and Environmental Sciences.

Elvis Asong, *Principal Scientist and CEO, Climalogik*
Day 1 Station 2 Facilitator – 3:15 – 4:45 pm

Elvis Asong is the Principal Climate Scientist at Climalogik Inc., an Associate at the Climate Risk Institute and an adjunct professor at the Global Institute for water Security in the University of Saskatchewan, Canada. He is an expert reviewer of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). His expertise lies in the provision of scientifically credible and practical climate information and expertise to help individuals and organizations make climate smart decisions and build resilience. He works with infrastructure climate risk assessment teams to gather, analyze, synthesize, tailor, summarize, advise, and communicate observational change and projected climate change trends and associated uncertainties that are used to inform PIEVC-based risk assessments. He has developed several application-ready climate data sets in data-sparse regions to support PIEVC-based infrastructure risk assessment projects. He enhances technical climate services capacities for teams through development and delivery of tailored training and climate data portals. For example, he is the lead developer of the course Applied Climate Science for Infrastructure Professionals (ACSIP) as part of the PIEVC Infrastructure Resilience Professional (IRP) Credentialling Program. The ACSIP course focuses on building competency and skills for engineers to access climate and hydrologic data and climate services, and to apply tailored climate projections in the context of engineering, infrastructure, and design to support climate change adaptation and resilience.

Francela Tencio Avila, *Meterologist, National Meteorological Institute (IMN) of Costa Rica*
Day 1 Panelist "Breakout Panel Sessions" Room 3 – 1:30 – 2:45 pm

Francela Tencio Avila is a meteorologist by profession. She obtained her degree from the University of Costa Rica. She has been working at the National Meteorological Institute since 2013, in the Meteorological Network and Data Processing Department as the person in charge of meteorological data management with experience in quality control and quality assurance.

Niklas Baumert, *Advisor, GIZ*
Day 1 Station 3 Facilitator – 3:15 – 4:45 pm

As advisor in the Global Programme Climate Services for Infrastructure Investments (CSI) at GIZ, Dr. Niklas Baumert has facilitated numerous PIEVC processes in Brazil, the Nile Basin and Lesotho. Niklas is an expert and specialized in scientific and applied risk and vulnerability assessments; as well as the governance of climate risk management in multi-stakeholder environments especially in the global south. He is experienced in providing training, facilitating multi-stakeholder processes, as well as providing advisory to national authorities on climate change mainstreaming and climate proofing with a sectoral focus on infrastructure. Niklas holds a PhD in Geography (Tsunami Early Warning Systems) from the United Nations University, Institute for the Environment and Human Security (UNU-EHS) based in Bonn, Germany.

Lindsay Bolton, *Group Lead of Water Resources and Climate Change, CBCL*
Day 1 Station 9 Facilitator – 3:15 – 4:45 pm

Lindsay is the Group Lead of Water Resources and Climate Change with CBCL. She has managed and provided lead technical oversight for many climate change risk and vulnerability assessments in support of adaptation planning for proposed design projects as well as existing infrastructure. Lindsay performs climate lens assessments, municipal climate change adaptation plans, infrastructure specific climate change risk and vulnerability assessments, resiliency and impact analysis, flood risk assessments, sanitary and storm water modelling and master plans, and floodplain mapping projects. Lindsay works on climate change and flood risk assessment projects across Canada and Internationally.

Hereditary Chief Frank Brown, *Indigenous Leadership Initiative Sr. Advisor*, *Heiltsuk Nation*
Day 1 Opening Remarks – 8:45 – 9:00 am

Frank Brown is a member of the Heiltsuk Nation from Bella Bella. His Hereditary Chiefs-Yíṁ ás name is λáλíyà sila meaning “preparing for the largest potlatch.” Brown is an adjunct professor in resource and environmental management at Simon Fraser University. He is also executive producer and co-curator of the Sacred Journey travelling exhibition. He recently received an Honorary Doctorate of Laws from Vancouver Island University and is a BMO Indigenous Advisory Council member.

Brown is a leader in the Pacific coast-wide ocean-going Indigenous canoe resurgence and served as initiator and events planner for the Tribal Journeys to Bella Bella in 1993 and 2014. Brown was the founding director of the Heiltsuk Integrated Resource Management Department and director of Land and Marine Stewardship for the Coastal First Nations – Great Bear Initiative. He co-developed and is implementing an Aboriginal Eco-Tourism training program with the Heiltsuk Tribal Council, Vancouver Island University and North Island College. He also supported the development of an Indigenous Guardians training program with Coastal First Nations – Great Bear Initiative and Vancouver Island University. Brown has served as a director of Aboriginal Tourism BC and was chairperson of the Heiltsuk Economic Development Corporation. He co-established and was the co-program manager for the FP Innovations, First Nations Forestry Program.

Brent Burton, *Division Manager, Metro Vancouver*
Day 2 : Fishbowl Panel 1

Brent has a background in civil engineering and water management from the University of British Columbia, and has been with Metro Vancouver since 2002 where he is currently the Division Manager for Utility Policy, Planning and Resilience in the Liquid Waste Services Department. He is a Fellow of Engineers Canada for service to the engineering community in the field of climate resilience and he was also one of the first Canadians to receive the Infrastructure Resilience Professional designation. He was the staff lead for one of the first PIEVC studies in Canada in 2008, an assessment of the Vancouver Sewerage Area. Since that time, he's been the staff lead for several other PIEVC studies including one for the regional water system. Prior to joining Metro Vancouver, Brent worked in the local consulting industry in a variety of water utility planning and analysis roles.

Dustin Carey, *Lead, Adaptation, Federation of Canadian Municipalities*
Day 1 Panelist "Climate and infrastructure risk assessment and PIEVC in the context of national adaptation planning" – 11:00 – 12:20 pm

Dustin Carey is the Lead, Adaptation with FCM's Green Municipal Fund and an Expert Consultant with the United Nations Department of Economic and Social Affairs. Specializing in climate adaptation, municipal asset management, capacity development and sustainable land use practices, Dustin works to enable local governments to create low-carbon, resilient communities. He wrote the Climate-Resilient Asset Management chapter of the United Nations' Managing Infrastructure Assets for Sustainable Development Handbook.

Vladimir Naranjo Castillo, *MBA, Head of Climate Change Directorate, Federated College of Engineers and Architects Costa Rica (CFIA)*
Day 1 Lunch Presentation – 12:20 – 1:30 pm
Day 2 Panelist "Meeting the emerging and future needs for climate change vulnerability and risk assessment" – 9:10 – 10:45 am

Vladimir is a civil engineer from the University of Costa Rica with a Master's degree in business administration with an emphasis on finance from the Costa Rican Institute of Technology and Project Management Specialist from Lead University. He has over 14 years of professional experience. Currently Vladimir holds the position of manager of the Climate Change Unit of the National Organization of Engineering and Architecture of Costa Rica (CFIA). Vladimir has worked as a senior project manager on a variety of projects, including climate risk assessments using PIEVC Protocol.

He has participated in different risk analysis for infrastructure projects facing climate change impacts in countries such as Costa Rica, Brazil, Peru, and Canada, including aqueducts, bridges, transmission lines, ports and mines, training both professional teams and community teams. Vladimir has represented the CFIA in the development of public policy and initiatives towards building resilience based on climate change risk management, including participating as an expert in the creation of MERCI CR, a climate risk assessment methodology for infrastructure in Costa Rica.

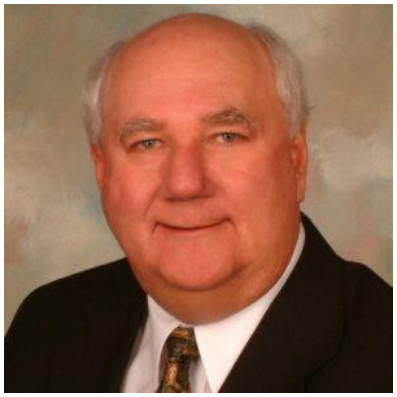
Pippa Cookson-Hills, *Climate Adaptation Specialist, City of Calgary*
Day 1 Panelist "Breakout Panel Sessions" Room 1 – 1:30 – 2:45 pm
Day 2 Co-Chair – 8:30 – 8:50 am

Pippa is an atmospheric scientist, working as a climate adaptation specialist with the City of Calgary. Last year, Pippa published the City's first Climate Projections for Calgary Report, and contributed to the City's Climate Strategy. She manages the City of Calgary's Climate Risk and Resilience Assessment (CRRA) program to facilitate conversations about climate adaptation and reduce climate risk across the Corporation.

Robin Cox, *Professor, Royal Roads University*
Day 2 Panelist "Meeting the emerging and future needs for climate change vulnerability and risk assessment" – 9:10 – 10:45 am

Robin is the program head for the graduate programs in Climate Action Leadership at Royal Roads University and a professor in the Disaster and Emergency Management graduate programs of the School of Humanitarian Studies. Cox is also the director of the Resilience by Design Research Innovation lab, a transdisciplinary research and educational outreach center that focus on building multigenerational climate action leadership and competencies. Cox is an active researcher with multiple nationally funded research projects. She led the Adaptation Learning Network (ALN), a three-year, $2-million project funded by Natural Resources Canada and the BC Ministry of Environment and Climate Change Strategy. This project is building climate adaptation capacity with organizations, professionals, businesses, and communities through professional development training and networking. Cox is an experienced disaster psychosocial responder and researcher with expertise in individual- and community-level resilience and trauma.

Darrel J. Danyluk, *P.Eng., FEC, FEIC, FCSCE, MASCE, FGC (Hon.), World Federation of Engineering Organizations (WFEO), Expert Advisor, PIEVC Alliance Associate*
Day 1 Co-Chair – 9:30 – 9:45 am



Darrel Danyluk, is a distinguished civil engineer, strong leader, and team builder in the engineering profession nationally and internationally. He has led organizations and businesses at the highest level always striving for technical excellence by creating respectful and nurturing environments.

Darrel Danyluk graduated from the University of Manitoba with a degree in civil engineering. His technical expertise developed from design and delivery of infrastructure projects in the water and transportation sectors with a large international consultancy. These civil engineering projects ranged from large municipal systems, with the complexity of regional servicing, to the challenges of major urban utility and transportation projects in Canada and internationally. His international experience began in Haiti, followed by infrastructure work in Central and South America, Africa, Europe, and Asia.

At Engineers Canada, as Chair of the Public Infrastructure Engineering Vulnerability Committee (PIEVC), he led the development and testing of a risk assessment protocol that determines the vulnerability of civil infrastructure to the

impacts of a changing climate. The use of this tool is expanding across Canada and internationally, and throughout its evolution he has actively contributed his technical and management expertise to PIEVC assessments and is currently a Special Advisor to the PIEVC Program.

In 2007, he became a Vice President and the Chair of the Standing Committee on Engineering and the Environment at the World Federation of Engineering Organizations (WFEO). In this capacity as the WFEO focal point he has been active at the United Nations Framework Convention on Climate Change (UNFCCC) by participation on expert working groups, presenting papers at side events, and intervening in the policy discussions on the environment and by presenting an engineering perspective on adapting infrastructure to the impacts of climate change, disaster risk management, sustainable development practice guidelines for engineers, infrastructure in developing countries and sustainable development issues and solutions.

Al Douglas, *President, Climate Risk Institute*
Day 1 Facilitator "Breakout Panel Sessions" Room 1 – 1:30 – 2:45 pm

Al is the President of the Climate Risk Institute. Since 2002 he has been developing and delivering adaptation resources to domestic and international decision-makers. Al played leading roles in two regional vulnerability assessments in Ontario and co-authored an ecosystems vulnerability assessment guidebook for Ontario. He has contributed content to previous National Assessments of climate change impact and adaptation and acted as an expert reviewer for the Intergovernmental Panel on Climate Change (IPCC). Al has expertise in climate science; climate change impact, vulnerability and risk assessments; policy development; and adaptation planning in natural resource sectors. In 2016 Al co-chaired Adaptation Canada 2016, Canada's first national symposium on climate change adaptation since 2005 and was a member of Canada's Expert Panel on Climate Change Adaptation and Resilience Results.

Honourable Rosa Galvez, *Senate of Canada*

Day 1 Keynote – 9:45 – 10:30 am

The Honourable Rosa Galvez is an environmental engineer, an independent senator at the Senate of Canada, and the President of the Parliamentary Network on Climate Change of ParlAmericas. She was a professor at Laval University in Québec for over 25 years and was Chair of its Civil and Water Engineering department from 2011 to 2016. She specializes in pollution control, water and wastewater treatment, municipal and hazardous waste, sustainable development, impact assessment and climate risk to infrastructure.

At the Senate of Canada, she is the Chair of the Senate Standing Committee on Energy, the Environment and Natural Resources and a member of the Standing Senate Committee on National Finance. In 2021, she was the sponsor in the Senate of the Canadian Net-Zero Emissions Accountability Act, providing an accountability framework for the Canadian federal government to achieve its net-zero emissions goal by 2050. She was also recipient of the Clean50 Award 2021 for her parliamentary work on climate and the environment.

Since her appointment at the Senate, Senator Galvez has published several policy papers including a discussion paper on Canada's building codes and a white paper on a clean and just recovery from the COVID-19 pandemic. In March 2022, she published a white paper on Aligning Canadian Finance with Climate Commitments, which led to the introduction in the Senate of Bill S-243, the Climate-Aligned Finance Act, legislation to help guide Canada's financial sector in its transition to a net-zero economy.

Kelby Hamilton, *Director General, Technical Services, Real Property Services, Public Services and Procurement Canada, Government of Canada*

Day 1 Panelist "Breakout Panel Sessions" Room 1 – 1:30 – 2:45 pm

Since 2019, as Director General of Technical Services in the Real Property Services Branch of Public Services and Procurement Canada, Kelby has been bringing together all the operational delivery teams and experts who develop policies, ensure compliance, and provide functional direction and strategic advice on complex technical matters to support the Minister in delivering her mandate commitments to Canadians. With a focus on Green and Sustainable Federal Real Property, supported by a team of architecture and engineering experts across a broad range of competencies, Kelby is leading a portfolio of files including Low Carbon Operations and Decarbonisation, Clean Electricity Procurement, Buy Clean Strategy (Embodied Carbon in Materials), Climate Adaptation, Biodiversity, Climate Change Vulnerability and Risk Assessments, and Green Fleet and Electrical Vehicle Charging Station Procurement for federal clients.

Kelby commenced his employment in Publics Works and Government Services Canada in August 2016, after an extensive 30-year military career in the Canadian Army, as an Electrical and Mechanical Engineering officer. He has a Bachelor of Science (Mechanical Engineering) from the University of Manitoba and a Master of Science (Industrial and Systems Engineering) from Virginia Polytechnic and State University in Blacksburg, Virginia, specializing in vehicular design and systems integration. Kelby is a Registered Professional Engineer in Ontario, and has been awarded the Project Management Competency Development Program Manager Level 3 designation from Treasury Board Secretariate of Canada.

Aridai Herrera, *President, Pan American Federation of Engineers (UPADI)*

Day 1 Lunch

Ari Herrera is a Distinguished engineer, life-long volunteered in organizations that make people's lives better, technology innovator and business owner. His expertise is in water and wastewater treatment processes. His knowledge and experience in multi-cultural settings with cross-discipline teams provides the basis for his strategic leadership and planning. He possesses a refined approach to orchestrating and securing key partnerships to assure successful and sustainable results. He is a consultant and technical advisor to national engineering firms, water treatment equipment manufacturers and municipal and industrial clients. His broad experience extends to consulting activities, preparation and teaching of capacity building courses, planning and design services, technology evaluation and selection and sustainable applied research innovation.

Designated as the Presidential Candidate for the Pan American Federation of Engineers (UPADI) election 2021 by the American Society of Civil Engineers (ASCE) and American Society of Mechanical Engineers (ASME) to represent the Engineering of the United States of America, he is the UPADI President (2023-2025). UPADI is the most prestigious engineering organization in the American Continent. He served as the Organization's President of the Technical Council in two occasions from 2013 – 2017 and as the Secretary of the Executive Board for four years since 2017. He held the position of Research Affiliate since 2005 in the Master of Engineering Program of the Department of Civil Engineering at the Massachusetts Institute of Technology (MIT) leading the Applied Water and Sanitation Research for Latin America and the Caribbean. Since 2010 he has been conducting leading innovative water and wastewater treatment technology research with professors at the UNESCO-IHE Water Institute, in Delft, the Netherlands. He is the UPADI representative to the Organization of American States (OAS) Member Countries. He has served for years as a

Reviewer of Environmental Engineering Project Proposals for the National Secretariat for Science, Technology, and Innovation of the Republic of Panama, SENACYT.

In October 2020, Mr. Herrera became a member of the Pan American Academy of Engineering (API). He is the author and co-author of acclaimed peer reviewed articles regarding High Mix Liquor Suspended Solids (MLSS) in MBR Systems and alternate aeration technologies. He has

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Ana Paula Higa, *Regulation Specialist in Waterway Transport Services, National Waterway Transportation Agency (ANTAQ)*
Day 2 Panelist "Practitioners Panel 2" – 11:15 – 12:00 pm

Ana followed the implementation of the technical cooperation between ANTAQ and GIZ related to the studies of the "Impacts and Risks of Climate Change to Brazilian Coastal Public Ports" and "Climate Risk Assessment and Adaptation Measures for Port Infrastructures."

Benjamin Hodick, *Benjamin Hodick, GIZ: Head of the Global Project "Enhancing Climate Services for Infrastructure Investments (CSI)"*

Day 1 Facilitator "Breakout Panel Sessions" Room 3 – 1:45 – 2:30pm
Day 2 PIEVC Alliance Strategic Directions – 1:20 – 1:35pm

Benjamin has more than 18 years working experience in development cooperation in Asia, Sub-Sahara Africa and Latin America, leading long-term projects and teams for 7 years in Vietnam and since 2017 in Bonn, Germany. His main thematic focuses have been the strengthening of public services in relation to natural resources, climate change adaptation and public financial management. Benjamin has an educational background in public policy and studied in Germany, Canada and the United States.

Don Iveson, *Executive Advisor for Climate Investing and Community Resilience, Co-operator's & Former Mayor of Edmonton*

Day 2 Keynote – 8:50 – 9:10 am

Don served as Edmonton's 35th Mayor from 2013 to 2021 with a guiding leadership principle to make things better for the next generation. This long-term view is now embedded in: Edmonton's smart-growth City Plan; City Council's Energy Transition Strategy; and Edmonton's nation-leading work on stormwater management and climate adaptation.

Since retiring from City Hall, Don continues to live in Edmonton. He works part-time with Co-Operators as Executive Advisor for Climate Investment and Community Resilience. Don is also ramping up Civic Good, a public policy advisory practice working on climate, housing, governance and civic innovation projects with like-minded clients ranging from startups to governments. He has accepted an appointment as a School of Cities Canadian Urban Leader at the University of Toronto and volunteers as Board Co-Chair of the Canadian Alliance to End Homelessness.

Catherine LaFleur, *Manager, Infrastructure Canada*
Day 2 Panelist "Meeting the emerging and future needs for climate change vulnerability and risk assessment" – 9:10 – 10:45 am

Catherine is originally from BC and has chemistry and forestry degrees from the University of British Columbia. She is currently living in Ottawa, where she works as a Manager of Adaptation and Resilience for Infrastructure Canada. Catherine is passionate about applying science to the challenges of climate change and enjoys translating research into practical tools to help make our world more resilient.

David Lapp, *FEC, P.Eng. Fellow of Engineers Canada, Senior Advisor to the PIEVC Program*
Day 1 Co-Chair – 9:30 – 9:45 am

David Lapp FCAE FEC P.Eng is an Ontario-registered professional engineer with over 40 years of professional practice – first in consulting engineering, scientific investigation and management consulting supporting marine navigation in Canadian and international ice-covered waters, followed by a career in a variety of roles with Engineers Canada for 23 years until his retirement in May 2020. His roles at Engineers Canada included international affairs, engineering qualifications and engineering practice guidelines with a focus on climate change, environment and sustainability.

David served as the Project Manager for the development, implementation and on-going program support for the PIEVC Protocol, a structured process to assess infrastructure climate risks and vulnerabilities. His work entailed the development, testing and validation of the Protocol through more than 30 case studies across Canada, and the development and delivery of more than 40 introductory training workshops. His involvement included applications of the Protocol internationally in Costa Rica, Honduras and the suite of the countries engaged in the GIZ Climate Services for Infrastructure Investment.

David is a Fellow of the Canadian Academy of Engineers and a Fellow of Engineers Canada. In 2018 he was given an Award for Engineering Excellence from Professional Engineers Ontario (PEO) for his work on climate change and engineering as well as an Engineering Excellence Award in the same year from the PEO Ottawa Chapter.

Gabrielle Lepage, *TAP-EDM Communications and Public Engagement Manager*
Day 2 Lunch

Gabrielle Lepage is the TAP-EDM Communications and Public Engagement Manager and joined the Alinea team since September 2022. Gabrielle helps promote the work of over 40 technical assistance initiatives implemented by Canadian experts in 32 countries around the world. Gabrielle is known in her work and community circles as a connector, a strategic thinker a passionate communicator, avid implementer, and creative enthusiast. Gabrielle was born and raised in Peace River, Alberta. Here background includes project management, community development, health promotion, and communications, through social media promotion and public relations.

Gabrielle has led teams in Saskatchewan, managing a comprehensive physical activity and healthy eating project, and directed a team supporting national francophone health and wellness initiatives in Ottawa with the Société Santé en français. Gabrielle lives in Ottawa. Her motto: "Work hard. Do good. Be incredible." - Cheryl Strayed.

Elmer Lickers, *Director of Asset Management, Ontario First Nation Technical Services Corporation (OFNTSC)*
Day 1 Panelist "Breakout Panel Sessions" Room 2 – 1:30 – 2:45 pm
Day 1 Station 5 Facilitator – 3:15 – 4:45 pm
Day 2 Table 7 Co-facilitator – 1:40 – 3:00 pm

Elmer is a Senior Advisor with OFNTSC and has been with the organization for over 28 years. In his current role he assists and advises First Nations communities on asset management and the implementation of federal government operation and maintenance programs and policies. He has been a strong advocate for introducing asset management planning and climate change risk assessments in First Nation communities.

Elmer spearheaded the development of the award-winning First Nations Infrastructure Resilience Toolkit (FN-iRT), which integrates climate change risks and asset management planning for First Nation communities. The tool includes asset management processes designed to make informed decisions on improving the performance of First Nations infrastructure. Elmer recognizes that having effective and streamlined processes are required to successfully plan, build, operate, maintain and replace community infrastructure.

Katharina Lotzen, *Advisor, Enhancing Climate Services for Infrastructure Investments, GIZ*
Moderator

Katharina has been working on resilient infrastructure since she joined the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in 2015. She holds a Master's Degree in Economics with specialization in Development and Environmental Economics. Currently, Katharina works at advisor for the global project Enhancing Climate Services for Infrastructure Investments (CSI). In the project, she is responsible for the global coordination of activities in Vietnam and digitalization activities in Brazil and also is part of the organizational team behind the PIEVC Practitioners' Network and PIEVC Global Forum. In her time working with the CSI project, Katharina took part in PIEVC assessments in Costa Rica and Vietnam.

Patrick Michell, *Former Chief, Kanaka Bar Indian Band*
Day 2 Panelist "Meeting the emerging and future needs for climate change vulnerability and risk assessment" – 9:10 – 10:45 am

Chief Patrick Michell has dedicated his life's work to taking grass roots actions to reduce the impacts of climate change in his community and beyond – and his tireless and common sense advocacy is well known across the political spectrum, both provincially and federally. Closer to home, under Chief Michell's leadership, Kanaka Bar has transitioned from a community struggling from the diverse impacts of Canadian colonization to a community that has instilled climate resiliency into all decisions and investments made within and by the community. The community has implemented a community resiliency plan that aims to further the energy self-sufficiency, sustainability, and vibrancy of Kanaka Bar. As a result of this plan, Kanaka Bar has installed over 40 kW of grid tied power in solar PV projects. The chief's leadership serves not only as an example for many other Indigenous communities but offers inspiration to all Canadians that the climate crisis isn't insurmountable.

Trevor Murdock, *Climate Scientist, Canadian Centre for Climate Services, Environment and Climate Change Canada*
Day 2 Panelist "Meeting the emerging and future needs for climate change vulnerability and risk assessment" – 9:10 – 10:45 am
Day 2 World Café Table 4 – 1:40 – 3:00 pm

Trevor is the Manager of Data and Products at the Canadian Center for Climate Services within Environment and Climate Change Canada, and has been a climate scientist since before it was cool (thanks to a Masters degree in Paleoclimate modelling from the University of Victoria in 1995). Trevor has focussed on helping people do useful things with localized climate projections since the inception of the Pacific Climate Impacts Consortium in 2005 and at the Canadian Institute for Climate Studies before that, as summarized in this one-minute video on Preparing for the Impacts of Climate Change.

Nguyen Trung Nam, *Researcher, Southern Institute for Water Resources Planning*
Day 1 Station 4 Facilitator – 3:15 – 4:45 pm

Nam works as researcher at the Southern Institute of Water Resources Planning (SIWRP) under the Ministry of Agriculture and Rural Development of Vietnam. He graduated from Thuy Loi University in Vietnam with a Bachelor's degree in Hydrology and Environment.

As a researcher in the SIWRP in 12 years, Nam has participated in numerous projects on water resources planning and natural disaster management in the water sector in Mekong Delta. Nam is passionate about sustainable water management and hydrometeorological risk reduction studies, focusing on building resilience in hydraulic works, irrigation systems, and other infrastructures. Nam has been part of the assessment team conducting both the PIEVC assessment for Cai Lon – Cai Be Sluice Gate, the biggest sluice gate of Vietnam and the risk assessment of the whole portfolio of sluice gates of Kien Giang province which was among the assessments that led up to the development of the PIEVC Portfolio Screening Guide.

Joel Nodelman, Engineers & Risk Manager, Nodelcorp
Day 1 Panelist "Breakout Panel Sessions" Room 2 – 1:30 – 2:45 pm
Day 1 Station 4 Facilitator – 3:15 – 4:45 pm
Day 2 World Café Table 4 – 1:40 – 3:00 pm

Joel has over 40 years of experience in engineering and management of energy, environment, climate change and sustainable development projects. He is a Principal at Nodelcorp Consulting, specializing in climate change risk assessment, adaptation, policy development, sustainable development, facilitation and training.

Joel is a noted risk assessment expert and uses this expertise as a foundation for developing climate change adaptation and strategies. Joel works on strategy and policy development initiatives, including planning, designing and developing protocols and procedures to assess asset vulnerability to climate change. He provides guidance to adoption of greenhouse gas mitigation measures and climate change adaptation strategies. Joel is an experienced public speaker, facilitator and educator with over a decade of teaching engineering courses in sustainable development and engineering management at the University of Alberta. He also designs and presents workshops and lectures to update engineering and business professionals on leading-edge

developments in climate change engineering vulnerability, risk assessment. Joel is a Professional Engineer and holds his M.Sc. (ENG) in Chemical Engineering and B.Sc. (Hon) in Chemistry both from Queen's University in Kingston. He also holds certifications in Climate Risk Management (CRM), and Infrastructure Resilience (IRP).

Uirá Cavalcante Oliveira, *Manager of Environment and Sustainability, National Waterway Transportation Agency (ANTAQ)*
Day 1 Panelist "Breakout Panel Sessions" Room 2 – 1:30 – 2:45 pm

As the Manager of Environment and Sustainability, Uirá is responsible for the proposal and coordination of ANTAQ's Environmental and Safety Agenda, which includes the strategic activity of promoting annual evaluations of the environmental management performance of Brazilian ports, through the application of an Environmental Performance Index (IDA), and the development of projects on subjects such as climate change mitigation and adaptation measures for port infrastructure and operation. One of the projects considered in the Agenda for the 2021-2022 period was the study on the "Impacts and Risks of Climate Change to Brazilian Coastal Public Ports", conducted by the ANTAQ's Division of Development and Studies in partnership with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). For the 2023-2024 Agenda, ANTAQ intends to promote the review and restructuring of the IDA, which should consider, among other topics, indicators related to the mitigation of climate change.

José Domingo Pérez, *P.E., PAAE, PRAE, President, Pan American Academy of Engineering (PAEE)*
Day 1 API Induction Ceremony Introduction – 9:45 – 10:30 am

Mr. Pérez is the Founder and President of CARIBE TECNO, Inc., a foremost service firm in the Caribbean recognized for its leadership, excellence and innovation in sustainable infrastructure, building and residential construction for over half a century. CARIBE TECNO's ten figures worth project list, include hundreds certified to Green Building Standards; Hospitals and Medical Facilities that incorporate cutting edge technologies in Neurosurgical, Cardiovascular, Trauma and Intensive Care; High Tech Office and Industrial Buildings, State of the Art Tourism Pier Structures and Train Stations, the Puerto Rico's Convention Center District, Museums, Schools, Recreational and Sports facilities, some of the plushest condos and tourist-residential projects; and many others that grace Puerto Rico's skyline. He is also the President of the Pan-American Academy of Engineering, the Puerto Rican American Academy of Engineering and the José Domingo Pérez Foundation, Former President of the AGM University Board of Directors (2006-2008), the Institute of Civil Engineers of Puerto Rico (1978-1980), Associated General Contractors of Puerto Rico (1995 & 1996), and a member of the Georgia Institute of Technology Advisory Board.

Amit Prothi, *Director General, Coalition for Disaster-Resilient Infrastructure (CDRI)*

Day 1 Evening Keynote – 6:30 pm

Mr. Prothi brings a wealth of international experience and expertise on climate and disaster resilience issues. He is an international expert with nearly 25 years of progressive leadership in the fields of urban planning and resilient infrastructure, with experience across more than 15 countries in North America, Asia and Europe. He has managed multidisciplinary teams on thematic topics that relate to climate change mitigation and adaptation including environmental planning, urban policy, land use and transportation planning, natural resource management, flood management, disaster resilient infrastructure, housing, and community development.

Recently, at the Atlantic Council's Arsht Rock Resilience Centre and previously at the Resilient Cities Network (and its predecessor 100ResilientCities), he engaged directly with cities, national governments, private sector partners, funders and technical experts to mainstream understanding of resilience and sustainability in development priorities.

Mr. Prothi has a Bachelors in Architecture from the School of Planning and Architecture in Delhi, and a Masters in Regional Planning from the University of Massachusetts at Amherst. He has also pursued doctoral studies (focusing on urban water resource management) at the Massachusetts Institute of Technology.

Harshan Radhakrishnan, *P.Eng., Manager, Climate Change and Sustainability Initiatives, Engineers and Geoscientists of British Columbia*
Day 1 Station 7 Facilitator – 3:15 – 4:45 pm
Day 2 Co-Chair – 8:30 – 8:50 am
Day 2 Panelist "Practitioners Panel 2" – 11:15 – 12:00 pm

As the Manager, Climate Change and Sustainability Initiatives, Harshan Radhakrishnan, P.Eng., deals with:

1.Management of programs and initiatives that help to address sustainability and climate change adaptation and mitigation in the practice of the professions.
2.Outreach to provincial and municipal governments, technical groups and others in relation to climate change and sustainability strategies.

Harshan is a Professional Engineer registered with Engineers and Geoscientists BC and APEGA with 10+ years of experience in environmental regulation, oversight of regulatory programs, as well as an in-depth understanding of the municipal, provincial and federal regulatory requirements. He provides staff support for Engineers and Geoscientists BC's Climate Change and Sustainability Advisory Groups and plays a key role in supporting the implementation of Engineers and Geoscientists BC's Climate Change Action Plan.

Nazareth Rojas, *Agricultural Engineer, National Meteorological Institute (IMN) of Costa Rica*
Day 1 Panelist "Breakout Panel Sessions" Room 3 – 1:30 – 2:45 pm

Nazareth Rojas holds an MSC in Economy, Development and Climate Change. As Project support and researcher at Costa Rica's National Institute of Meterology, she has been part in all of the PIEVC applications in Costa Rica up to this point to develop the necessary Climate Services. She also assumed an instrumental role in the development in the MERCI climate risk assessment methodology.

Dan Sandink, *Director of Research, Institute for Catastropic Loss Reduction*
Day 2 PIEVC Alliance Strategic Directions – 1:20 – 1:35 pm

Dan Sandink is Director of Research at the Institute for Catastrophic Loss Reduction. Since joining ICLR, Dan has authored or co-authored more than 50 technical reports and articles on topics related to protecting Canadians and their property from the impacts of extreme rainfall/urban flooding, high wind, wildland-urban interface fire, and hail. Dan's writing has also focused on public disaster risk perceptions, public adoption of household disaster risk reduction practices, the role of insurance in managing disasters, climate change adaptation and vulnerability assessment, building materials and products designed to mitigate disaster risk at the household level, among many other topics.

Dan is currently ICLR's manager of the Public Infrastructure Engineering Vulnerability Committee climate vulnerability assessment protocol program, is Co-Chair of Canada's Adaptation Platform's national Infrastructure and Buildings Working Group, is a member of NRCan's Adaptation Plenary, and is a member of FireSmart Canada's Technical Committee. Dan currently sits on nine technical committees for National Standards of Canada that concern managing risk of climate change, high wind, and extreme rainfall flooding for buildings in Canada. Dan is a graduate of the geography and planning programs at the universities of Guelph, Western Ontario and Toronto.

Ritesh Sardjoe, *Permanent Secretary Directorate for the Environment at the Ministry of Spatial Planning and Environment Suriname*
Day 2 Lunch

Ritech Sardjoe is the Permanent Secretary Directorate for the Environment at the Ministry of Spatial Planning and Environment Suriname. He has experience planning, designing and monitoring of several coastal protection related projects, including the sea dike Coronie Suriname, river embankment protection Suriname river, collection of topographic and bathymetric data from the right bank of the Suriname River in the district of Commewijne and several maintenance projects at Weg Naar Zee Suriname. Ritesh participated on the second National Adaptation Plan of Suriname on behave of the ministry of Public Works of Suriname. He is a lecturer at the Anton De Kom University of Suriname, Faculty of Technology (FteW), Department of the Infrastructure Engineering and a lecturer at the Polytechnic College of Suriname.

Katharina Schmidt *Advisor, GIZ*
Day 1 Station 3 Facilitator – 3:15 – 4:45 pm

As advisor in the Global Programme Climate Services for Infrastructure Investments at GIZ, Katharina Schmidt is responsible for backstopping the programme's component in Costa Rica. She was also responsible for steering the development of the PIEVC Green. Next to her engagement, she is also working in the global programme Human Mobility in the Context of Climate Change. Previously, she served as Project Officer at the International Organisation for Migration in Geneva as well as the European Commission's Directorate for development policy and climate action. Katharina holds a Msc in International Development Studies from the University of Amsterdam and a BA in Social Anthropology from the University of Hamburg.

Clare Share, *Professional Engineer, McElhanney*
Day 1 Station 1 Facilitator – 3:15 – 4:45 pm

Clare has over 15 years of years of experience and has worked in both the public and private sectors, giving her insight to operational processes and funding constraints faced by municipalities. Her expertise in climate risk management helps clients achieve more resilient infrastructure in a shorter timeframe. She is particularly adept at communicating these risks to the public in an easy-to-understand manner and has successfully implemented many public engagement campaigns. She can review and present information in a way to maximize public buy in and support. She has extensive experience preparing strategic flood risk assessments for towns and regions, site-specific flood risk assessments for commercial and residential development, watershed flood management plans, stormwater management plans and schemes, and asset management planning.

Norman Shippee
Day 1 Panelist "Breakout Panel Sessions" Room 1 – 1:30 – 2:45 pm

Norman Shippee, Ph.D., is the Canadian Technical Lead for Climate Change Vulnerability and Adaptation and Senior Climate Scientist at Stantec Consulting, based in Ottawa, Ontario. He is a Climatologist with extensive research and climate risk assessment experience. He earned his Ph.D. at the University of Victoria and was a postdoctoral research associate at the Pacific Climate Impacts Consortium. Norm has over 10 years of experience in the climate and meteorology field, through teaching, research, climate analytics and projections, risk and resiliency assessments (using Engineers Canada's PIEVC Protocol and other methodologies that conform to international ISO standards), adaptation planning, facilitating stakeholder engagement, and workshop delivery. Additional areas of expertise include radar and satellite meteorology, forecasting, climate modelling, and assessing the impacts of extreme weather through climate forensics.

Dr. Shippee has worked with a wide array of clients across the international, federal, provincial, municipal, and private sectors to handle climate risks to their assets, services, and business needs. His primary contribution to building better communities is in bridging the gap between analytical science and end-user needs by engaging stakeholders and using the input to develop tailored solutions to extreme weather and future climate uncertainty. He is also an experienced facilitator for climate resiliency, risk, and vulnerability assessments worldwide.

Dominique Sigg, *Director of Climate Risk Management*, *BC Climate Action Secretariat*
Day 1 Station 8 Facilitator – 3:15 – 4:45 pm
Day 2 Table 8 Co-facilitator – 1:40 – 3:00 pm

Dominique Sigg (PhD) is the Director of Climate Risk Management, Climate Action Secretariat (CAS) with the B.C. Ministry of Environment and Climate Change Strategy. She has worked at CAS in the fields of climate risk management and adaptation since 2018. Dominique has led or been part of a team that has delivered several climate resilience initiatives within CAS, including the Preliminary Strategic Climate Risk Assessment for BC (2019), the Climate Preparedness and Adaptation Strategy for BC (2022), and most recently a Disaster and Climate Risk and Resilience Assessment, currently underway and co-led with the Ministry of Emergency Management and Climate Readiness. Want to know more about this new risk and resilience assessment? Come to the Fishbowl session (Perspectives of Government Policy and Users of PIEVC) at 11:15 on Day two of the forum!

Jeanette M. Southwood, *FCAE, FEC, LL.D. (honoris causa), P.Eng., Vice President, Corporate Affairs and Strategic Partnerships*
Day 1 Wrap up and Reflections – 4:45 – 5:15 pm

Award-winning engineer and leader, Jeanette Southwood is Vice President, Corporate Affairs and Strategic Partnerships at Engineers Canada. Before joining Engineers Canada, she led the Canadian Urban Development & Infrastructure Sector and the Global Sustainable Cities teams at an international consulting firm where she was the first Black woman to be appointed to the senior leadership position of Principal globally in its 50-year history at that time. At Engineers Canada, Jeanette's team's portfolios include: Belonging and Engagement; Communications; and Public Affairs, Government Relations and Public Policy. Also a longtime and dedicated volunteer with a number of organizations and on several boards over the years, Jeanette is a Fellow of Engineers Canada, a recipient of the Province of Ontario's "Leading Women Building Communities Award," an inductee into Professional Engineers Ontario's Order of Honour, and a recipient of the Governor General's Sovereign's Medal. Jeanette is a Fellow of the Canadian Academy of Engineering, which recognizes engineers contributing in exemplary ways towards their disciplinary fields and the wider community. She has received an Honorary Doctorate as well as the Ontario Professional Engineers Awards' Engineering Excellence Medal. She was also honoured as one of Canada's Clean50 for her work and dedication to sustainable development, leading change, championing innovation, and changing our world for the better. Jeanette has been inducted into the University of Toronto's Engineering Hall of Distinction and was twice named one of WXN Canada's Top 100 Most Powerful Women, as well as being recognized as one of the Women of Innovation. She was appointed by the federal government as an Honorary Captain of the Royal Canadian Navy, the first affiliated with the Naval Engineering Community. Jeanette sits on the TD Insurance Advisory Board on Climate Change.

Erik Sparling, *Vice-President, Climate Risk Institute*
Day 2 PIEVC Alliance Strategic Directions – 1:20 – 1:35 pm

Erik is Vice President of the Climate Risk Institute. He has 15 years' experience providing and overseeing delivery of research, analysis, training, and decision-support services for the management of climate-related risks across various infrastructure and natural resource sectors. He has delivered these services as Policy Advisor at the National Round Table on the Environment and the Economy (NRTEE), lead climate change adaptation resource at the Canadian Standards Association (CSA), Director of the Climate Group at Risk Sciences International (RSI), and National Program Manager at the Canadian Centre for Climate Services (CCCS). Key accomplishments have included: initial development of the NRTEE program on climate change adaption policy; delivery of the first suite of nationally-accredited infrastructure adaptation guidelines and standards; delivery of main portions of the Northern Infrastructure Standardization Initiative (providing climate change adaptation standards for the Canadian North); leadership in the development of various climate change risk analytical tools and assessments; and, various contributions to the early development of the CCCS

Erin Taylor, *Director, Adaptation and Resilience Division, Infrastructure Canada*
Day 1 Panelist "Breakout Panel Sessions" Room 3 – 1:30 – 2:45 pm

Erin's team leads climate adaptation and resilience policy development that informs infrastructure programming and advances climate resilient public infrastructure investment, including the development and implementation of the infrastructure theme of the National Adaptation Strategy and the Government of Canada Adaptation Action Plan. This team also works closely with the National Research Council and the Standards Council of Canada to develop climate resilient codes, standards and guidance and promote their uptake across Canada. Erin co-chairs INFC's federal-provincial-territorial Resilient Infrastructure Working Group (with the Government of British Columbia) and is a member of the Infrastructure Resilient Infrastructure Resilience Professional (IRP) Stewardship Committee. Prior to joining Infrastructure Canada in September 2022, Erin spent 20 years leading climate change mitigation and adaptation policy development for the Government of Prince Edward Island. Erin is trained as an environmental scientist with a B.Sc. from the University of Guelph and a M.Sc. from the University of Windsor. She is passionate about building collaborative relationships, networks and human-centred policies and programs.

Modathir Zaroug, *Regional Water Resources Modeler, Nile Basin Initiative*
Day 1 Panelist "Breakout Panel Sessions" Room 3 – 1:30 – 2:45 pm

Dr. Modathir Zaroug is a regional water resources modeler at the Nile Basin Initiative Secretariat since Sep 2017, leading all the climate change adaptation and some water resources activities. Zaroug has several years of experience in climate modeling, atmospheric science, climate change adaptation, climate risk assessment, climate research, water resources management, and hydrology. Beside his experience in hydrological modeling and analysis; he is also familiar with the regional climate models calibration, validation, postpossessing and analysis. Zaroug has experience on the impact of landuse change on the regional climate. He has experience working with large modelling output and observational datasets through shell scripts, CDO, NCO, Grads. The computing skills including computing knowledge necessary for climate diagnostics, prediction, and good working knowledge of compiled computer languages and model output visualization packages. Zaroug has advanced proficiency in communicating

scientific findings in peer reviewed journals and at professional meetings. He has some publication in Nature Climate Change. He led several regional and international projects in the field of climate and water resources.
He was a postdoctoral research fellow for three years in the Adaptation at Scale in Semi-Arid Regions (ASSAR) project. He was a part of a multi-disciplinary research group at the African Climate & Development Initiative (ACDI) at University of Cape Town, interacting with research teams from Southern Africa, West Africa, East Africa and India. He worked with the Sudanese Ministry of Irrigation and Water Resources since Nov. 2003.

He has a PhD from the University of Khartoum and International Center for Theoretical Physics (ICTP), Trieste, Italy. During that time he worked three years at Drought Early Warning and Forecasting in Africa (DEWFORA) to strengthen preparedness and adaptation in Africa. He got his M.Sc. in Hydroinformatics from UNESCO IHE for Water Education, Delft, Netherlands.

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