

Despite the urgency of climate change, many communities and institutions struggle to translate complex scientific data and cascading impacts into practical strategies for resilience and adaptation. Traditional approaches often lack the inclusivity, engagement, and local relevance needed to foster meaningful community action.

This Climate Preparedness project explores the theory that localized methods are essential to enable diverse networks of individuals and organizations to imagine and prepare for climate futures together, and draws from literature to frame why we are exploring the use of serious games as a capacity-building approach.

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Climate change is a wicked problem driven by complex and interconnected systems of power, economics, social structures, and systems that perpetuate unsustainable practices (Stein, 2024). Climate impacts are equally complex, including intersecting health, social, economic, political, and cultural impacts that amplify and exacerbate existing inequities to disproportionately affect those populations and communities least responsible for creating the problem and least able to respond effectively to mitigating the impacts due to poverty, geography, and ongoing marginalization (Smith et al., 2022). This is especially true for Canada’s Indigenous populations (NCCIH, 2022; Mihalus et al., 2024). This has significant implications for emergency planning, requiring shifts that have been recognized in global (e.g. Sendai Framework), national (e.g., National Adaptation Strategy), and regional (BC’s new Emergency and Disaster Management Act – EDMA) policy frameworks. All of these call for more proactive and *whole of society* approaches (i.e., bringing disaster risk reduction (DRR), disaster risk management (DRM) and climate change adaptation (CCA) together) (Arnell, 2022), and for the application of an equity lens as the main guiding principle for all actions (Cannon et al, 2023; Jerolleman and Waugh, 2022; Lillywhite and Wolbring, 2022).

The multi-sector, multi-disciplinary networks necessary to this new approach demand more than technical expertise; they require social, relational competencies that enable individuals, organizations, and communities to manage change, resolve conflicts, coordinate across disciplines and professions, foster communication, and ensure effective knowledge mobilization and coordinated action. Building and sustaining such multi-sector, multi-disciplinary teams can be hindered by disciplinary silos that lead to misunderstandings and difficulties in knowledge sharing (Turnhout et al., 2020) and a lack of shared conceptual frameworks (i.e, variations in terminology, values, beliefs, and methodological approaches; Jacobs et al, 2016). Developing and sustaining such alliances requires significant investments in relationship building, knowledge translation, and negotiation to ensure effective and cohesive action (Cvitanovic et al., 2015). Integrated

emergency planning additionally requires navigating and addressing persistent and pervasive trust-based issues many communities have based on current and historical negative experiences of working with outside professionals and governments (Fleming et al, 2020).

Continuing to apply traditional capacity building strategies (e.g., standard single discipline courses and training) with existing and emerging professionals (i.e., university students) fails to address these and other challenges (e.g., accessibility and availability).

Transdisciplinary emergency planning requires transdisciplinary, applied learning processes; however, there is a dearth of research on transdisciplinary learning approaches and outcomes (O’Sullivan, 2025) or on cooperative serious games (Flood et al., 2018). There is even less on the application of serious games in the contexts of DRR, DRM, CCA (Fleming et al., 2020; Hügel, S. and Davies, 2022). What research does suggest, however, is that by bringing diverse participants together in an interactive environment, serious games can facilitate active participation and collaborative problem-solving (Flood et al., 2018), and the development of shared understanding around climate risks, adaptation strategies, and emergency preparedness (Fleming et al., 2020), moving participants from passive learning to active engagement (Cassidy et al., 2019). This interactive process builds trust, strengthens social bonds, and fosters a sense of shared purpose—all key ingredients for improving approaches to emergency planning in ways that increase equity, social cohesions, and community resilience.

The challenges in building competencies for integrated emergency planning and climate resilience stem from the limitations of siloed capacity-building approaches (Leiren, et al, 2018). Traditional education often prioritizes technical skills (e.g., engineering, climate data analysis, etc.) while neglecting the social competencies needed to navigate complexity, conflict, and multi- or transdisciplinary work (Nightingale, et al, 2019). Responsibility for emergency planning typically resides in public sector organizations, where capacity issues are as much about funding envelopes and labour availability as applying climate knowledge. Complex jurisdictional issues also exist between federal, provincial, municipal, regional and Indigenous governments (Birchall, et al., 2023). The cascade of climate impacts across ecological, social, and economic systems creates ripple effects that defy sectoral boundaries (Lawrence, et al., 2020) and generate emergent threats simultaneously to infrastructure, public health, and ecosystems (National Adaptation Strategy) that resist discipline-bound solutions. The complex domains of climate adaptation and emergency preparedness require addressing place-specific capacities and vulnerabilities that bring together Western and Indigenous science, local lived experiences and social equity considerations (Canada’s National Adaptation Strategy, 2024).

Why Serious Games?

Serious games create shared spaces for diverse interest and rights holders—engineers, emergency managers, healthcare professionals, policymakers, community leaders—to collaborate and operationalize competency-building efforts by:

- **Simulating Complexity:** Players experience cascading impacts (e.g., balancing infrastructure budgets with equity needs and other tradeoffs), fostering systems thinking (Fleming, et al., 2020; Galeote et al., 2021).
- **Building Social Capital:** Collaborative gameplay strengthens trust and networks, which are foundational for real-world collective action (Gomes, et al, 2021).
- **Mainstreaming Foresight:** Serious games like TAG enable BC local governments and post-secondary institutions to test long-term strategies in low-risk environments (Rodela et al., 2019).

The barrier to advancing serious games as a learning modality for both public sector employees and emerging professionals/students results from limited experience with, and applied research on, the outcomes of such immersive cooperative learning experiences, and concerns about extending novel learning strategies in public sector communities. Transformative programming disrupts the status quo, which requires evidence of its efficacy and social impact.

We propose that the barriers of low interest, understanding, and acceptance can be overcome through research-embedded applications of serious gaming that target the new emergency planning competency and practice requirements by testing:

- **Perspectives** e.g., simulating real-world, place-based climate risks and adaptation challenges, where serious games participants experience the complexity of climate change and its impacts, working with others who bring multiple knowledge and cultural values.
- **Structures** e.g., where there is support for inclusive and iterative learning by engaging diverse stakeholders and right holders, representing various roles and responsibilities (e.g., municipal and regional emergency managers, policymakers, critical infrastructure owners, community members, university students) while challenging disciplinary/sectoral barriers to support an inclusive adaptation and emergency preparedness planning process that deepens participants' understanding of both individual and collective resilience-building roles.
- **Practices** e.g., the impacts of an iterative process which allows communities to experiment with solutions and adapt strategies together while considering multiple

perspectives and voices, drawing on existing strengths/assets, and creating new relational practices and norms.

Advancing a transdisciplinary research lens on outcomes and impacts of climate-foresight serious games, as a valid mechanism for shifting public policy decisions, jurisdictional coordination, climate adaptation and emergency preparedness policy and practice, may overcome the current barrier of recognition of alternative learning modalities.

Potential for transformative impact

Effective emergency planning for disaster risk reduction and climate change adaptation requires context-specific, place-based options that bring together diverse actors in engaged, experiential processes that reflect local socio-economic and biophysical realities rather than one-size-fits-all models. Effective capacity-building also requires opportunities to practice skills necessary for navigating the complexity of real-world emergency and climate resilience planning in the evolving context of climate change. Climate resilience is best fostered through lived experience and intersectional, transdisciplinary approaches that integrate multiple worldviews and ways of knowing and invite and support the participation of those often left out of emergency planning processes including equity seeking groups, youth, and Indigenous peoples.

The story-based, cooperative gamified approach to capacity building engages participants in dialogue, co-design, and context-sensitive learning, and offers a powerful tool for fostering shared understanding, accommodating and incorporating diverse perspectives, ways of knowing, and knowledge (Western and Indigenous) and supporting collective decision-making (Pederick, B. et al., 2024).

Place-based scenario games ground the learning with real-world inputs (e.g., local maps, local climate risk profiles, local values) and offers potential of supporting communities/regions co-creating their own resilience and adaptation pathways while enhancing social cohesion, trust and relationality (Machado de Oliveira 2021).

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