@Risk: Nuclear Waste Management in Canada

Duane Bratt
Mount Royal University
Calgary, Alberta
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Outline

- Description of Project
- Types of Risks and Uncertainties
- Level of Affectedness
- Types of Risk Management Tools
- Preliminary Assessment of level of Democratization in Canada's decision-making process

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@Risk Project

- Multidisciplinary team looking at Strengthening Canada's Ability to Manage Risk.
- Housed at the University of Ottawa's Institute for Science, Society, and Policy
- Principal Investigator Monica Gattinger

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@Risk Project

- Assessing three sectors:
  - Energy (nuclear and fracking)
  - Public Health (vaccinations and cancer screening)
  - Genomics (Newborn screening and gene editing)

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@Risk Project

- Nuclear Case lead is Duane Bratt
  - RA is Xavier D. Phillion
  - Partners include Keith Dewar, Bob Walker, Renee Silk, Adrienne Ethier
- This research examines the role of risk assessment and management in the decision-making processes of selecting a site for Canada's permanent high-level nuclear waste storage.

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Nuclear Case Selection

- Geographically, this study focuses on two areas: the potential sites and, once selected, the transportation routes.
- Temporally, this case study focuses on the site and route selection processes, up until the facility is licensed to operate.

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Nuclear Case Selection

- There are five communities currently under consideration by the NWMO:
  - Hornepayne (NW Ontario)
  - Huron-Kinloss (SW Ontario)
  - Ignace (NW Ontario)
  - Manitouwadge (NW Ontario)
  - South Bruce (SW Ontario

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Types of Risk

1. Technological
   - Deep Geological Repository (DGR) and storage casks
2. Environmental
   - Contamination of soil/water from DGR
   - Geological Processes, Tectonic Movement, Climate Change could damage the DGR
3. Human Health
   - Exposure to radiation

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Types of Risk

4. Political
   - Site Community, Transportation Routes, larger Public Opinion
5. Security
   - Transportation accidents, terrorism
6. Financial
   - Cost of DGR, maintaining/improving transportation routes, etc

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Types of Risk

- Doing nothing is not risk free.
- There are multiple risks to doing nothing and leaving the status quo in place for managing nuclear waste.

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Types of Uncertainties

- Epistemic
  - How do we know the nuclear waste disposal is going to be safe/durable for 100,00 years?
  - Corrosion, pressurization, earthquakes, future ice ages, human interference
- Semantic
  - We don’t know how to make sure no one will dig out nuclear waste in the distance future.
- Normative
  - Should Canada continue to produce nuclear energy? Critics argue that instead of focusing on nuclear waste management, a complete phase out of nuclear energy should be done.

Level of Affectedness

- Do individuals have a voice?
- Do they have a choice?
- Are they able to mitigate risks?

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Level of Affectedness

- Individual-Dependent
  - Host Community
  - Local communities living near the chosen site
- Individual-Affected
  - Directly affected individuals are the communities living along the transportation route.
  - Indirectly affected individuals live in the broader community.

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Risk Management Tools

- *REACT* Framework
- *R*egulatory Interventions
- *E*conomic Interventions
- *A*dvisory Interventions
- *C*ommunity Interventions
- *T*echnological Interventions

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Regulatory Interventions

- CNSC
- NWMO

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Economic Interventions

- Nuclear Liability and Compensation Act
- Financial Compensation for a community to host the DGR
  - Interested communities have already received money for participating in preliminary assessment and engagement processes.

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Advisory Interventions

- Knowledge transfer from experts on nuclear energy and waste management to interested communities.
- NWMO has commissioned expert briefing documents and sent individuals (including from anti-nuclear groups) to interested communities.

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Changes in the past
NO CONTOUR DATA

Community Interventions

- NWMO maintains that “project will only be located in an area with an informed and willing host.”
  - How do you determine consent? Referendums, town hall meetings, local political support, or absence of local opposition?
  - Can consent be given and then taken away?

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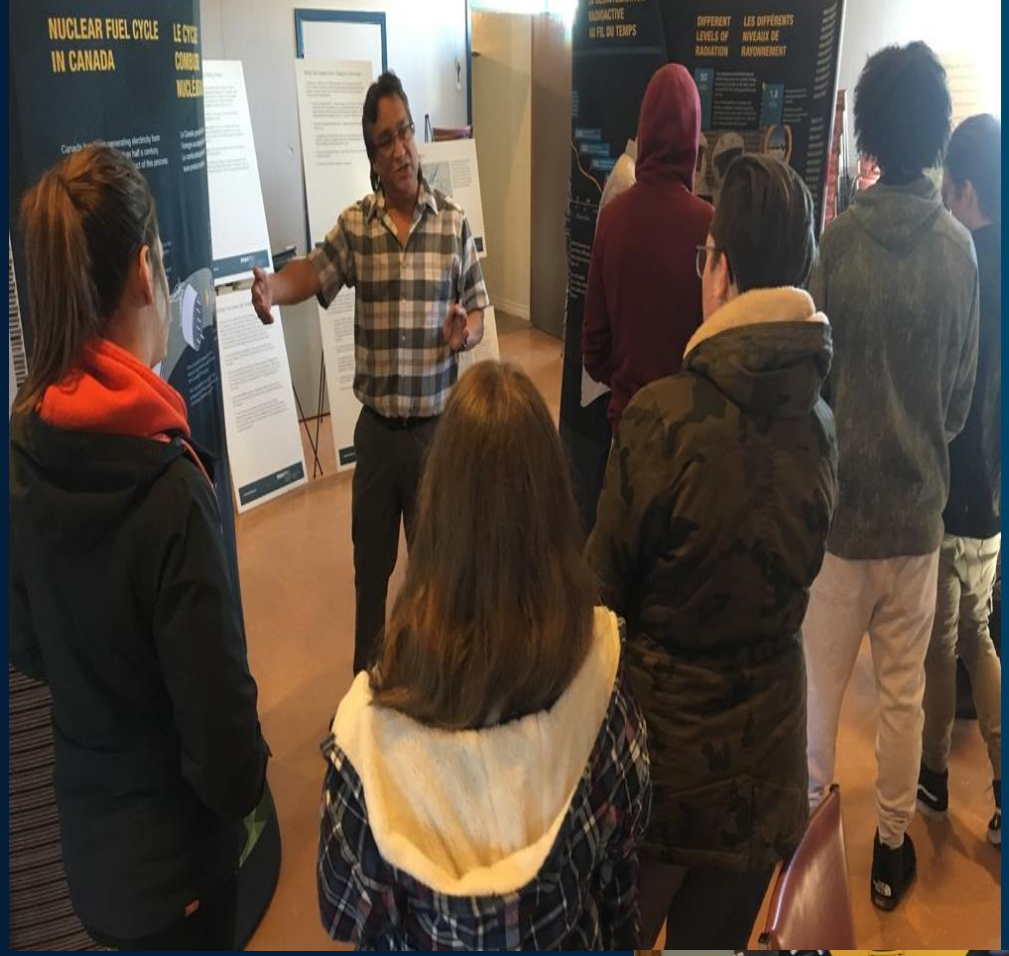
NUCLEAR FUEL CYCLE
IN CANADA
DIFFERENT LEVELS OF RADIATION
LES DIFFÉRENTS NIVEAUX DE RAYONNEMENT


BARRIER 2: THE FUEL ELEMENT AND THE FUEL BUNDLE
Each fuel bundle is composed of a number of sealed tubes called fuel elements. Fuel elements contain the fuel pellets and are made of a strong, corrosion-resistant metal called Zircaloy.
BARRIÈRE 2 :
BARRIER 3: THE USED NUCLEAR FUEL CONTAINER
Columbia


Project timelines
nwmo

Community Interventions

- NWMO recognizes the importance of Indigenous Knowledge.
- Duty to Consult

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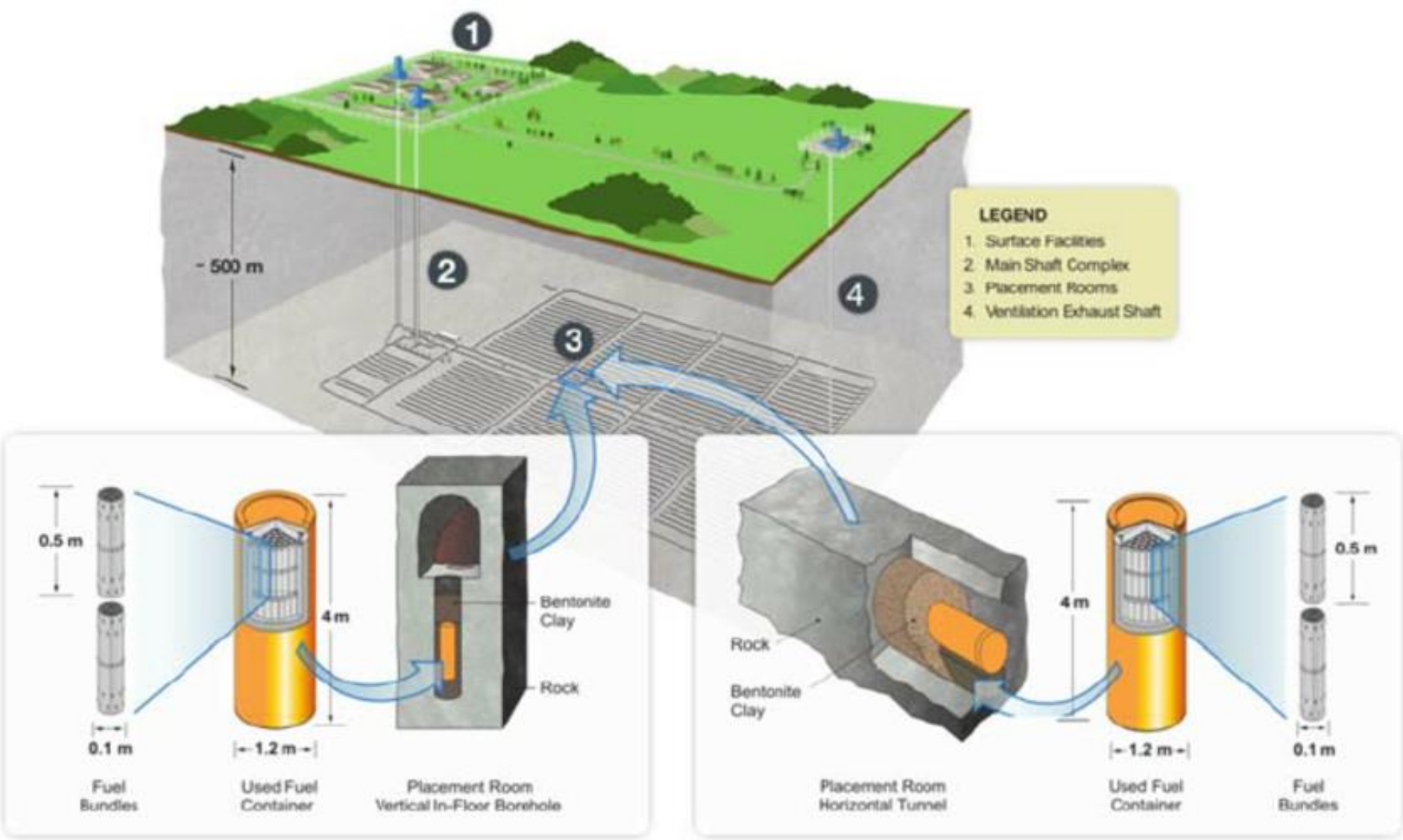
Technological Interventions



Level of Democratization

Democratic Principle	Criteria	Individual Assessment			
		Cluster	Lead	RA	Avg.
Transparency	Transparency of risk management decisions; is the rationale for decisions publicly available? Are the uncertainties involved clearly stated?	-	8	8	8
Inclusiveness & Representativeness	Presence and scope of formal public participation opportunities: is there public notification of risk management process? Is input solicited? Are a broad range of stakeholders involved?	-	7	8	7.5
Deliberative quality	Non-experts public involvement in risk management process Including: risk dimension analysis (types & numbers of risk); risk estimation (hazard characterization, uncertainties); risk control options (choice of tools/options to reduce risks); development and implementation of communication strategies; monitoring & evaluation	-	7	7	7
Accountability	Accountability of those conducting risk management to parliament, legislatures or other publicly elected representatives	-	9	8	8.5
Overall Assessment - Combined Level of Democratization	Combining the score for each criterion, marked out of 10. Total scores for combined four criteria of 0-10 (“minimal”); 11-30 (“moderate”); and 31-40 (“high”).	-	31	31	31