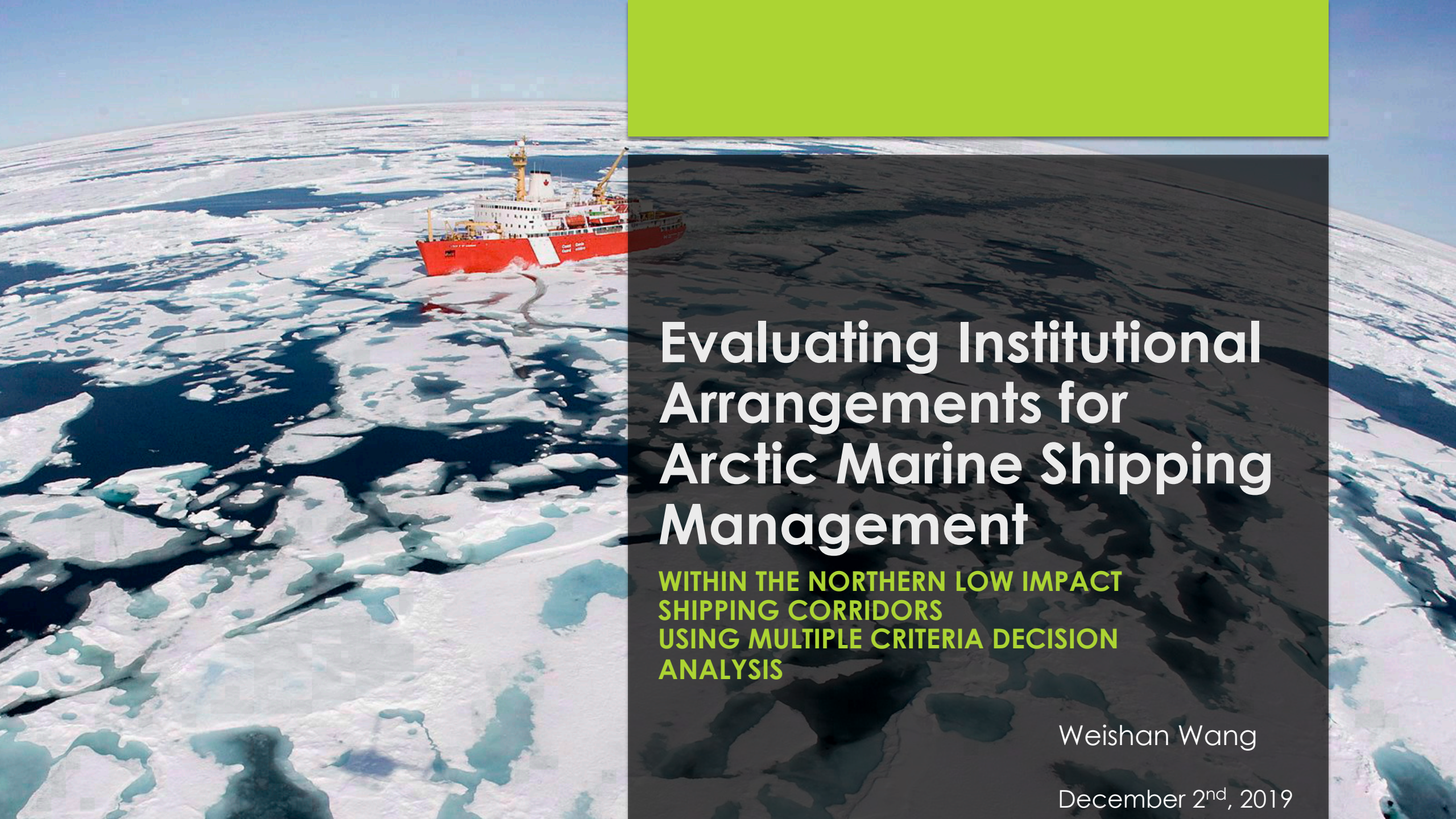

Evaluating Institutional Arrangements for Arctic Marine Shipping Management

WITHIN THE NORTHERN LOW IMPACT SHIPPING CORRIDORS USING MULTIPLE CRITERIA DECISION ANALYSIS

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Outline

- Internship – MMM GP

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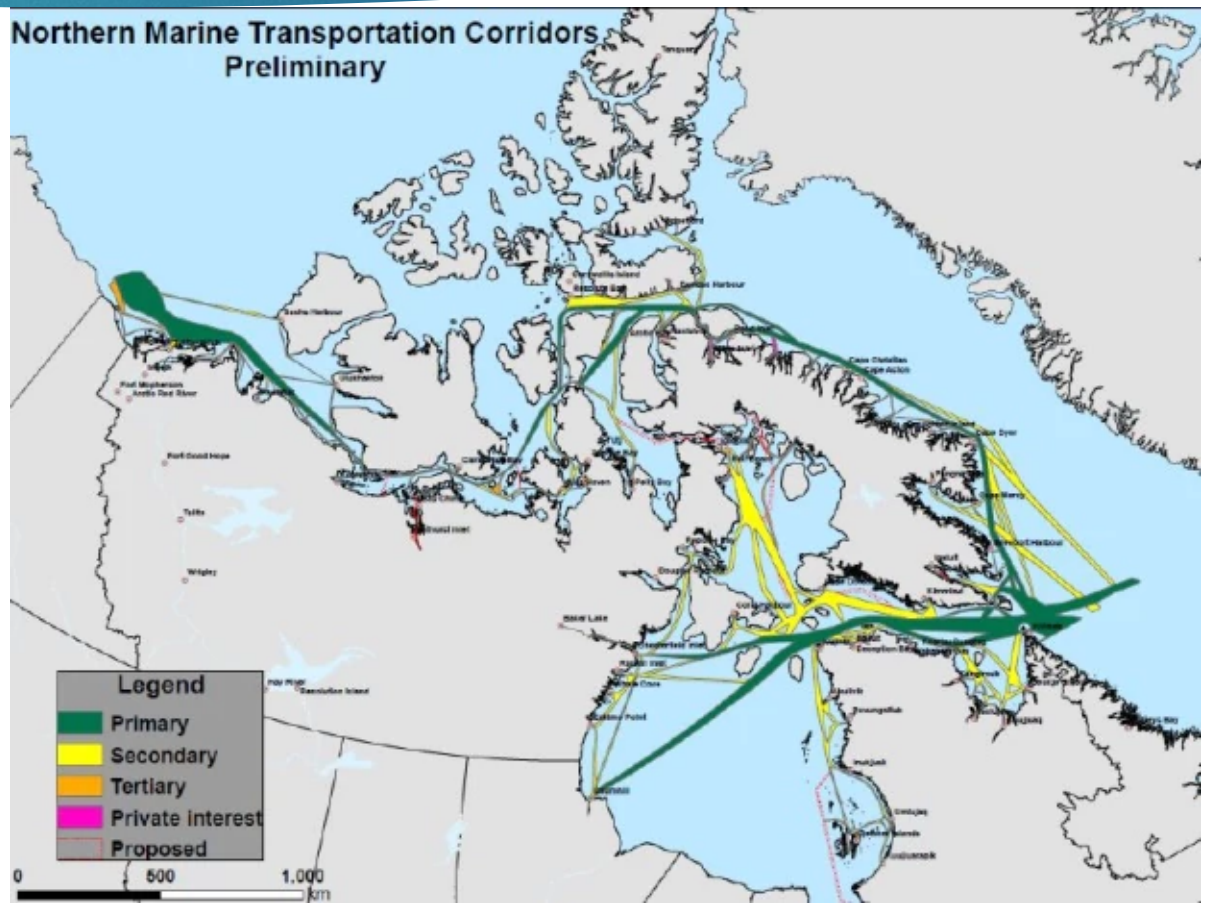
- Management Problem
- Research questions
- Approaches
- Results
- Recommendations

Management Problem

- Increasing shipping activities present risks and negative impacts
- The Oceans Protection Plan (TC) and the 'Low Impact Shipping Corridors' or 'Corridors'
- Preliminary design of the Corridors overlaps with some socio-ecological sensitive areas.
- Lack of an appropriate institutional arrangement for integrating multiple stakeholders into decision-making process within the Corridors.



Source: Canadian Coast Guard

Research Questions

1

What can be managed?

i.e. Shipping routes, speed, schedule, emission

2

Who can manage?

i.e. Stakeholders (governments, shipping related economic sectors)

3

How to manage?

i.e. Different forms of institutional arrangements

4

How to evaluate?

i.e. Attributes and criteria

Approaches

- **Literature review-** shape the scope and objectives
  - Marine shipping activities within the Corridors mainly refer to commercial shipping activities while fishing and cruise tourism activities are secondary for analysis.

- **MCDA-** key methodology
  - Definition: Multiple Criteria Decision Analysis (MCDA)
  - Applied areas: natural resources management, spatial planning and on-land corridors' design (combined with GIS)
  - Key elements: Decision makers, Alternatives and Criteria

Approaches

- **MCDA decision matrix**

Table. 1 MCDA decision matrix

Institutional forms / Alternatives / Attributes / Criterion	Co-management	Co-governance	Shared Leadership
	Alternative 1 (A1)	Alternative 2 (A2)	Alternative 3 (A3)
Attribute 1	Criterion 1 (C1)	A1C1	A2C1	A3C1
Attribute 2	Criterion 2 (C2)	A1C2	A2C2	A3C2
…	…	…	…	…
Attribute n	Criterion k (Ck)	A1Ck	A2Ck	A3Ck

Equal weights; **Green** (High), **Yellow** (Medium), **Red** (Low)

Results

- Factors and receptors in Arctic marine shipping

Major Result 1- Table 2. Major Factors in Marine Shipping and the Receptors of Shipping Impacts

Issues / Factors \ Receptors	Local Communities	Marine and Coastal Wildlife	Shipping Companies and industry	Fisheries	Resource industry	Cruise tourism	Multiple Levels of Government
Maritime Security / **Position or Location (Hydrographic mapping)**	Disturb hunting and transportation activities	Affect living patterns and degrade habitats	Voluntary use low-impact corridors	Overlaps with fisheries areas	Affect final resource products' price	Use proposed corridors occasionally	Develop low-impact shipping corridors (GOC); mandatory routeing and reporting schemes (IMO and coastal states)
Marine Safety / **Accidents**	Affect living environment	Threaten marine ecosystem	Loss of ships, goods and crew life	Discharge of pollutants	Affect transport schedules	Affect beauty of landscape	Pollution incident response (CCG); NORDREG (CCG)
Marine ecosystem / **Pollution prevention**	Emissions and pollution	Underwater noise	Operation standards	Growth and life safety	Increasing cost	Improve quality	Polar code (IMO, 2016); AWPPA, zero discharge act (TC)

Results

- Stakeholders of Arctic marine shipping management

Major Result 2- Table 3. Stakeholders of Shipping in the Canadian Arctic and their Interests (part of original table)

Governance level	Receptor group	Stakeholders	Management targets and interests
International	Governance Institution	International Maritime Organization (IMO)	• Marine security (ship construction and operations); • Maritime safety (goods and life); • Marine ecosystem (marine environment and shipping pollution).
Federal or National	Governance Institution for Marine Shipping	Transport Canada (TC)	Issues related to maritime security, marine safety; marine environment protection: Discharges (pollution and emission), position (corridors and restricted-use zones), speed, time, and other types of transportation (Coast Guard's ice-breakers)
Territorial	Shipping industry	Nunavut Marine Council (NMC)	• Infrastructure for community supply; • Development and enforcement of proper standards for ships operating in ice-covered waters, including trained operators with experience in Nunavut
Local	Local communities	Hunters and Trappers Organizations (HTOs)	• Shipping impacts on marine mammals; • Shipping routes overlap and interrupt on-ice tracks; impacts on traditional lifestyle;

Results

- Three alternatives

Table 4. A Comparison among Three Forms of Institutional Arrangements

	Co-management	**Co-governance**	**Shared Leadership**
Definition	Co-management is an institutional arrangement, whereby multiple stakeholders achieve an agreement covering a specific geographic region and make decisions affecting multiple actors.	Arrangements in which ultimate decision-making authority resides with a collaborative body, where power and responsibility are shared between government and local stakeholders.	A property of a group where leadership functions are distributed among group members. Shared leadership offers a concept of leadership practice as a group-level phenomenon.
Application areas	Resource management (fisheries, wildlife and natural resources); marine protected areas	Resource management (fisheries, wildlife and natural resources); marine reserves	Business area: team building and school education
Selected best practice	Four co-management boards in Nunavut, Canada	Natural Resource Management (NRM) programme, Australia	New Shared Arctic Leadership Model

Attributes	Criteria
Integrity of decision making procedures	1. Does the institution arrangement include complete rules/regulations for decision making procedures such as: o Proposal rating/ranking/selection; o Trade-offs; o Voting system/process. 2. Does the institution arrangement have guidelines/principles for encouraging public participating in the decision-making procedures?
Legal basis and Jurisdiction	3. Which legislative level is this institutional arrangement based on? o Land Claims Agreement; o Federal regulations/laws/memorandums of understanding; o Official/Public documents of federal, territorial, local department. 4. This arrangement usually involves a single/multiple governance level. 5. This arrangement is usually used in single/small/multiple/large jurisdiction(s).
Specificity and Clarity	6. Is this institutional arrangement usually used for solving broad/comprehensive/specific/simple issues? 7. Does the arrangement have a clear/vague purpose/targets? 8. Do the stakeholders/decision makers participating in this arrangement have clear/vague roles and responsibilities?
Financial support for the institutional body	9. Does this institutional arrangement have adequate/inadequate financial support from government/organization/company? 10. Does this management/governance body have constant/intermittent financial support?
Degree of Collaboration	11. Does this institutional arrangement take both economic and socio-ecological impacts into consideration during decision-making process? 12. Does this arrangement consider both scientific knowledge and traditional ecological knowledge (TEK) in its knowledge co-production processes?
Representativeness	13. Stakeholders in the management/governance board are from all/some/part of/limited sectors related to the management issue. 14. Can this arrangement reflect all/most/some different interests of different stakeholders.
Equality	15. Equal/unequal power/voting rights/veto in decision-making process; 16. Each stakeholder is impacted/benefited fairly.

Institutional arrangements / Alternatives / Criterion / Attributes		Co-management Alternative 1 (A1)	Co-governance Alternative 2 (A2)	Shared Leadership Alternative 3 (A3)
Integrity of decision making procedures	Criterion 1 (C1)	A1C1	A2C1	A3C1
	Criterion 2 (C2)	A1C2	A2C2	A3C2
Legal basis and jurisdiction	Criterion 3 (C3)	A1C3	A2C3	A3C3
	Criterion 4 (C4)	A1C4	A2C4	A3C4
	Criterion 5 (C5)	A1C5	A2C5	A3C5
Specificity and clarity	Criterion 6 (C6)	A1C6	A2C6	A3C6
	Criterion 7 (C7)	A1C7	A2C7	A3C7
	Criterion 8 (C8)	A1C8	A2C8	A3C8
Financial support for the governing body	Criterion 9 (C9)	A1C9	A2C9	A3C9
	Criterion 10 (C10)	A1C10	A2C10	A3C10
Degree of Collaboration	Criterion 11 (C11)	A1C11	A2C11	A3C11
	Criterion 12 (C12)	A1C12	A2C12	A3C12
Representative	Criterion 13 (C13)	A1C13	A2C13	A3C13
	Criterion 14 (C14)	A1C14	A2C14	A3C14
Equality	Criterion 15 (C15)	A1C15	A2C15	A3C15
	Criterion 16 (C16)	A1C16	A2C16	A3C16
Cost Efficiency	Criterion 17 (C17)	A1C17	A2C17	A3C17
Effectiveness	Criterion 18 (C18)	A1C18	A2C18	A3C18
Uncertainty	Criterion 19 (C19)	A1C19	A2C19	A3C19
Tightness	Criterion 20 (C20)	A1C20	A2C20	A3C20
Transparency	Criterion 21 (C21)	A1C21	A2C21	A3C21
	Criterion 22 (C22)	A1C22	A2C22	A3C22

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DA Decision Matrix

ults Summary of MCDA Decision Matrix

	Green (High)	Yellow (Medium)	Red (Low)
Co-management	15	2	3
Co-governance	11	9	0
Shared Leadership	4	8	8

Recommendations

- 1. Allocate weights to MCDA criteria and use weighted calculation to get precise results.

Weights can be discussed in advance by stakeholders.

- 2. Reach consensus previously by promote gradual consultations.

Consider different interests and select attributes and criteria

- 3. Develop instructions, guidelines and principles for decision-making process.

Improve the overall effectiveness of MCDA

Thank you

Photo credit: the Wall Street Journal