

Beyond Carrying Capacity: Assessing data and frameworks for measuring and monitoring sustainability



SSHRC  CRSH

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Background

Accounting for human/environment complexity requires data, indicators, and frameworks that include relationships between:

- Social,
- Economic,
- Health, and
- Ecological systems

While the scope, volume, and availability of data has increased, challenges remain.

Research Questions

How can the data within sustainability-relevant indicators and frameworks be best measured, interpreted, and used to:

- (1) understand the “state” of data and measurement?
- (2) leverage policy performance and inform practical action as a response?

What is being measured, how, where, by whom, and why?

Objectives

- Evaluate bias in relevant measurement frameworks in meeting ecological, socioeconomic/demographic and health goals
- Assess the factors that facilitate implementation and uptake by policy actors
- Mobilize knowledge to influence the use and innovation of inter-sectoral indicator frameworks, indices and indicator suites

Scoping Review – Methodology (Arksey & O'Malley 2005)

Carrying Capacity Literature by Subject and Location

- 109 English language, academic and grey literature studies.
- Urban and regional bias.
- Gaps in study for rural, remote, and Northern communities.

	Canadian Studies	Relative Comparator Studies	International Studies
Peer-Reviewed Academic Studies	28 (60.9%)	6 (85.7%)	49 (87.5%)
Non-Academic Studies	18 (39.1%)	1 (14.3%)	7 (12.5%)
Total	46	7	56

The literature as a whole...

- Academic literature:
 - Focused on local areas/species.
 - Emphasis upon disciplinary factors rather than Anthropogenic effects.
- Grey literature:
 - Seeks a more integrated approach.
 - Often uses the UN Sustainable Development Goals as a framework.
- Both have a strong ecological bias.
- Intersectoral and integrative work is minimal.

Results: Thematic analysis of data utilization in Canada

Literature and Dataset Themes Present in Canadian Studies

- Most studies measured ecological variables.
- More themes are accounted for within the studies than is actually being measured.

Primary Sector	Number of Studies by Literature Theme	Percentage of Studies by Literature Theme	Number of Studies by Dataset Theme	Percentage of Studies by Dataset Theme	Ratio of Literature Theme to Dataset Theme
Ecological	33	32.1%	20	31.2%	165.00%
Health	23	22.3%	14	21.9%	164.29%
Socio-demographic	31	30.1%	18	28.1%	172.22%
Economic	16	15.5%	12	18.8%	133.33%
Total	103	100.0%	64	100.0%	

Results: Thematic analysis of data utilization Internationally

Literature and Dataset Themes Present in International Studies

- Discrepancies between what the literature was purporting to measure and what the data was actually measuring
- 22 studies claim to examine economic dimensions, yet only 10 items actually include economic data

Primary Sector	Number of Studies by Literature Theme	Percentage of Studies by Literature Theme	Number of Studies by Dataset Theme	Percentage of Studies by Dataset Theme	Ratio of Literature Theme to Dataset Theme
Ecological	51	43.6%	27	40.3%	188.89%
Health	22	18.8%	18	26.9%	122.22%
Socio-demographic	22	18.8%	12	17.9%	183.33%
Economic	22	18.8%	10	14.9%	220%
Total	117	100.0%	67	100.0%	

Results: Numeric Summary

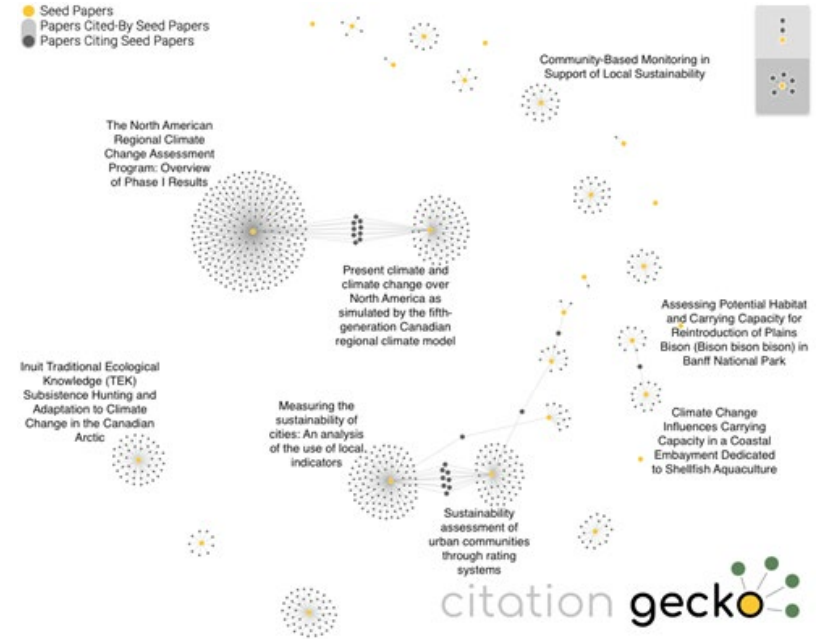
- Of the 109 studies, many (n=47) do not explicitly use data.
- Majority of the studies (n=91) address the ecological dimension of sustainability, while fewer address:
 - Socio-demographic (n=56)
 - Health (n=45), and
 - Economic (n=40) themes
- Majority of studies (n=51) use ecological themed data, while fewer studies use:
 - Socio-demographic (n=35)
 - Health (n=34)
 - Economic (n=25) themes

Citation Network Analysis

Papers Cited-By Canadian Articles



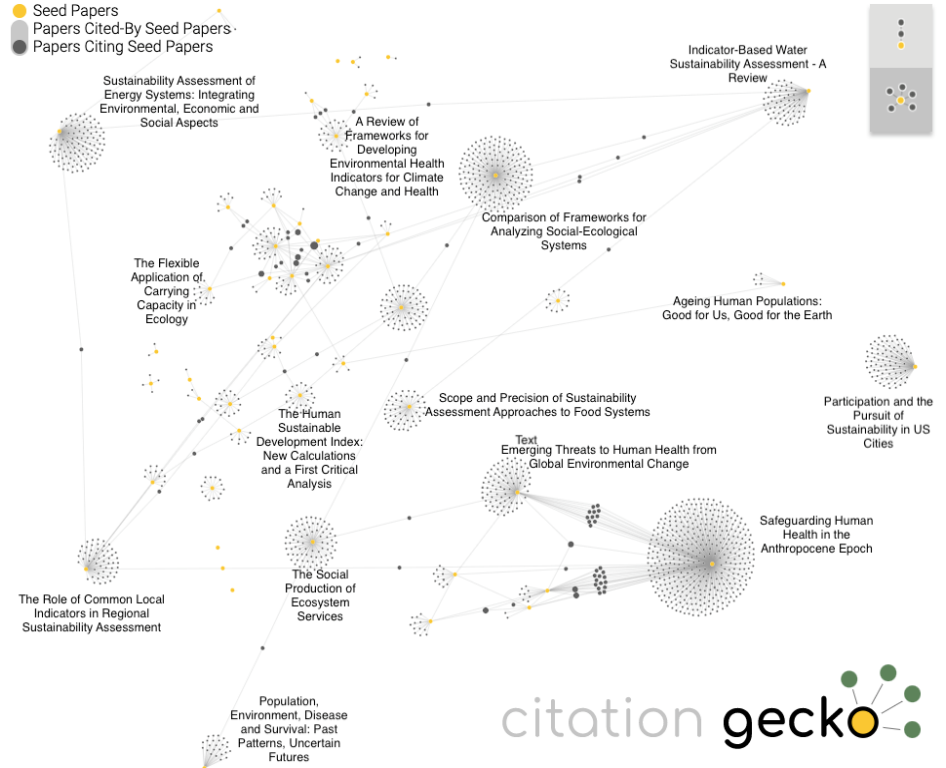
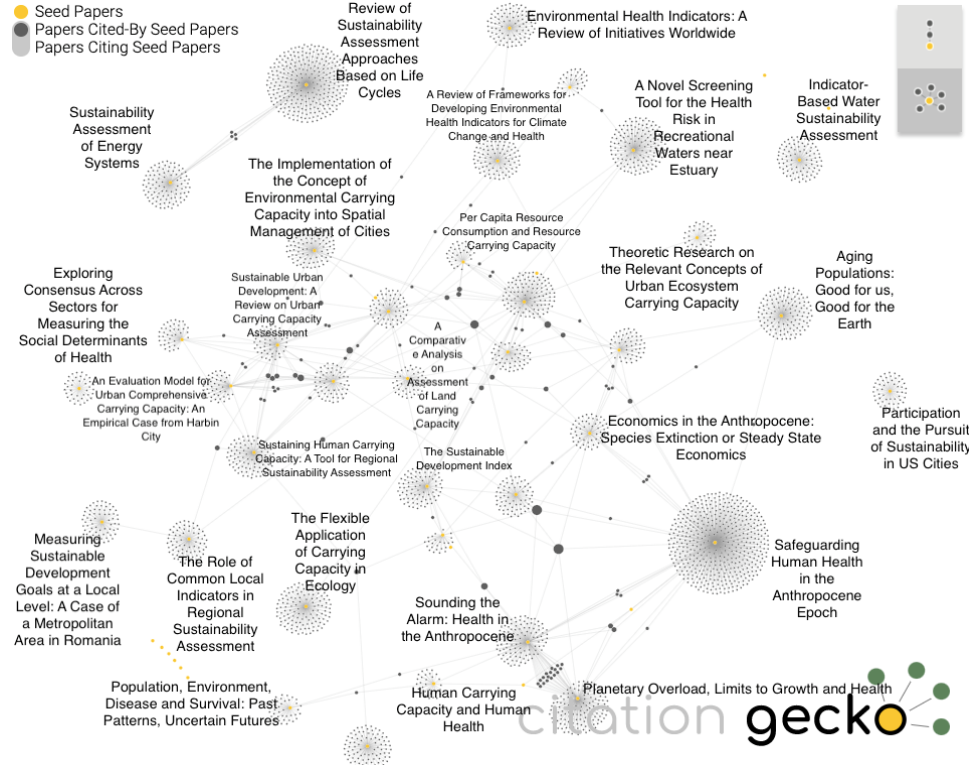
Papers Citing Canadian Articles



Citation Network Analysis

Papers Cited-By International & Relative Comparator Articles

Papers Citing International & Relative Comparator Articles



Results: Citation Network Analysis

- There are minimal connections between the literature.
- Many studies stand alone.
- The literature is largely compartmentalized and well referenced is not linked into other similar research.

Results: Consultations

- Participants agreed that:
 - ecological indicators and measures are well-developed
 - good social indicators are lacking
 - there is a lot of rhetoric about the need for integration, but a lack of operationalization

Conclusions

- Academics and organizations are measuring what they want, how they want
- No model or consensus about how these ideas fit together
- The terms carrying capacity & sustainability are used inconsistently
- Ecological Bias
- There are few examples of systems-based approaches to data, indicators, and frameworks

Implications: Why does it matter?

- It is incredibly difficult if not impossible to compare indicators and data across jurisdictions
- Inconsistent use of terminology results in a wide-ranging literature that is not interconnected
- The ecological bias means that we know far less about the socio-demographic, health and economic impacts
- Little is known about best practices regarding the measurement of the relationship between the environment and society

Recommendations

- Need to conceptualize & apply carrying capacity & sustainability from a systems-based approach. This requires:
 1. Integrative frameworks
 2. Measuring and comparing data consistently
 3. Centering intersectoral effects
- National targets & standardized indicators and methodologies that speak to local and national priorities and complement international goals, are needed to promote:
 1. Consistency
 2. Comparability
 3. Collection of longitudinal data

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