

Title: Measuring Ecological Footprint and Biocapacity to manage Canada's use of carrying capacity

About the project:

This project aims to understand the demand for knowledge about Canada's use of the Earth's regenerative capacity, as measured by Ecological Footprint and Biocapacity. Biocapacity measures the capacity of lands and waters to sustain humans with renewable resources such as food and fibres and forest products, to sequester anthropogenic carbon emissions, and to accommodate built settlements. This capacity is comparable to demand, measured as Ecological Footprint, with its additive components of cropland, grazing land, fishing grounds, lands used by built-up infrastructure, and forested lands providing forest products or sequestering carbon.

Our research appraised and synthesized information that is currently available to the public and academic audiences. We appraised the academic literature about the concept and measurement of Ecological Footprint and Biocapacity. We compared this supply of knowledge to an appraisal of its demand among relevant Canadian actors, including academics, policymakers, non-governmental leaders, and other sustainability workers. We also conducted a sensitivity analysis to examine the relevance and substitutability of nationally-versus internationally sourced input data, in response to early engagements with Federal policymakers that raised this as a question.

We found that academic and global research continues to grow, demonstrating sustained applicability and broad demand for Ecological Footprint and Biocapacity data. We found comparatively little uptake in Canada, even though there has been – and remains – significant Canadian research and scholarship. We provide these findings in our synthesis report and are now mobilizing awareness of the work and developing a research program based on the outcomes.

Key findings:

- Currently, there are no governmental measures of the “carrying capacity” of Canada's lands and waters at a Federal or Provincial or Territorial level. The closest national measures are an inventory of land cover, timber stocks, and the reserves of select minerals and fossil fuels, measured in physical and monetary units. Neither units infer sustainable rates of use.
- Fortunately, this gap can be partly filled by the National Ecological Footprint and Biocapacity accounts, which are currently produced by academic researchers. Biocapacity supplied within a jurisdiction is comparable to demand measured by Ecological Footprint, in units that allow comparisons over time and with other jurisdictions. Footprint is measured on a production basis and a trade-adjusted consumption basis, after accounting for the Biocapacity embedded within exports and imports. Data from these accounts are publicly available at a national and international level covering 1961-2017.
- In 2017, about 78% of Biocapacity in Canada was needed to sustain the Ecological Footprint of economic activities within Canada. About 57% of this footprint was used to produce exports, which is disproportionately large considering that Canada exports about 30% of domestic production. In 2017 more than twice as much Biocapacity was used per dollar of Canadian exports than per dollar of Canadian imports; this difference was even larger in prior years since being measured in 1961.

- Since 1961, Canada’s Ecological Footprint has doubled due to rising carbon emissions. On a per-capita average basis, the Ecological Footprint of Canadian consumption has fluctuated around a modestly declining trend.
- Unfortunately, these accounts are not widely known or understood within Canadian policy communities despite decades of growing academic research and interest and open-access data. For this reason, we appraised the academic literature since the late 1990s by coding the most-cited research papers and synthesizing their findings as part of our knowledge mobilization efforts.
- Among Canadians policymakers who we surveyed about the concept and measures, there is an interest in sub-national accounts. Policymakers have also raised questions about the relevance and substitutability of nationally-versus internationally sourced input data at the national level.
- We conclude that greater understanding and uptake of Ecological Footprint and Biocapacity accounting will require developing toolkits catered to specific audiences and validated by focus groups with key stakeholders. Our research confirms that the globally-sourced data used to produce the national accounts reflect Canadian-reported data, such as from Statistics Canada, so Canadian policymakers ought to use the accounts in Canadian reporting and policymaking.

Policy implications:

- Living within the Earth’s carrying capacity requires accounting systems and metrics that are jurisdictionally scalable and relatable to trade. Management of carrying capacity in Canada is mostly provincial, so provincially-scalable measures are needed. These should also map to national and international economic accounts that track trade flows. Ecological Footprint and Biocapacity accounts could fulfill this role if they were better understood and developed.
- Pan-Canadian interest in “nature-based solutions” to reduce climate change and stop biodiversity loss requires an integrative area-based accounting of carrying capacity. The path to a carbon-neutral Canadian economy involves challenging trade-offs, such as using arable lands for afforestation to sequester carbon, versus producing ethanol, versus food, versus settlements. These demands can add pressure upon scarce biodiversity. Ecological Footprint accounting can help to measure competing demands on Biocapacity.
- Government-financed economic stimulus should be informed by metrics beyond jobs and Gross Domestic Product (GDP). Even with abundant carrying capacity in Canada, about 78% is needed to sustain domestic production, with the remainder used for sequestration in a world that is already in overshoot of the sustainable global supply. Footprint accounting could be used to evaluate the additional direct, and indirect, pressures on Biocapacity implied by economic stimulus.

For further information:

Read the full report at: https://footprint.info.yorku.ca/canada_carrying_capacity

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