

On the Radar



Valuing natural capital – Is it on your radar?

What was once an unknown to most CPAs and a curiosity of others, could soon be standard accounting practice.

In 2022, the International Public Sector Accounting Standards Board (IPSASB) issued a [Consultation Paper on Natural Resources](#) to develop guidance for the recognition, measurement and presentation of natural resources by public sector entities. Concurrently, a consortium of over 70 organizations from across Canada led by the Intact Centre for Climate-Resilient Infrastructure, KPMG, and the Municipal Natural Assets Initiative issued a call to Canada’s Public Sector Accounting Board (PSAB) for recognition of natural assets in accounting. The intent being to “reflect the monetary value of natural assets in Canada, including carbon sequestration and storage, flood protection and biodiversity benefits” ([Eyquem et al., 2022](#)).

Notably, this is not just a public sector trend. In 2022, the International Sustainability Standards Board (ISSB) issued two *Exposure Drafts* including [IFRS S1 – General Requirements for Disclosure of Sustainability-Related Financial Information](#) (IFRS S1) and [IFRS S2 – Climate-related Disclosures](#) (IFRS S2). The draft requirements in IFRS S1 emphasize that “sustainability-related risks and opportunities arise from an entity’s dependencies on resources and its impacts on resources” and that when an entity’s business model depends on a natural resource, such as water, “it is likely to be affected by changes in the quality, availability and pricing of that resource.” Through consultation on IFRS S2, the ISSB has received strong feedback on the importance of the connection between climate and nature, including biodiversity, deforestation, and water, and has committed to enhancing the Climate-related Disclosure Standard as it relates to resilience.

And lastly, during the UN Biodiversity Conference (COP15) in Montreal, in December 2022, the ISSB announced that it will seek feedback on a potential research project on biodiversity and ecosystems ([IFRS Foundation, 2022](#)), building on existing market-led initiatives such as the Taskforce on Nature-related Financial Disclosures (TNFD), the Capitals Coalition, and other disclosure frameworks on nature.

With such a convergence of efforts to have nature reflected on balance sheets and performance reports, it is important for CPAs to learn about approaches and methods available to assign economic value to the many benefits that natural resources, natural assets, natural infrastructure, biodiversity, and ecosystems deliver to society, the economy, and the environment.

This article is meant to help CPAs navigate the terrain ahead.

Terms used on the playing field

There are a range of relevant terms and organizations that CPAs should be aware of. While the distinction between terms can be difficult to grasp, some of the common definitions are provided below.

- **biodiversity:** The variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part ([CCME, 2021](#)). Biodiversity is an integral part of natural capital.
- **Capitals Coalition:** A global collaboration of more than 400 organizations, representing business, finance, government, science and other stakeholder groups, tasked with the development of decision-making frameworks to identify, measure and value organizational dependencies on natural, social, and human capitals ([Capitals Coalition, n.d.](#))
- **ecosystem:** A dynamic complex of plant, animal, and microorganism communities, along with the non-living environment interacting as a functional unit ([CCME, 2021](#)).
- **ecosystem goods and services:** Ecosystem goods include all the tangible products and materials derived from the natural environment, such as food, water, fibers, and pharmaceutical ingredients. Ecosystem services are the conditions and processes through which natural ecosystems sustain a flow of direct and/or indirect benefits to people ([CCME, 2021](#)).
- **natural assets:** The stock of natural resources and ecosystems. Examples of natural assets include wetlands, rivers, lakes, forests, fields, coastal marshes, dunes, and soils ([Eyquem et al., 2022](#)).
- **natural capital:** Often used interchangeably with natural assets, natural capital is another term for the stock of renewable and non-renewable, physical and biological resources (e.g., air, water, soils, minerals, biodiversity, plant and animal species and more) that combine to yield a flow of benefits to people ([CCME, 2021](#)).

- **natural infrastructure:** The use of preserved, restored or enhanced elements or combinations of vegetation and associated biology, land, water and naturally occurring ecological processes to meet targeted infrastructure outcomes (CCME, 2021). Examples of natural infrastructure include engineered wetlands for flood protection and water filtration, stormwater collection ponds, shelter belts, and fire breaks.
- **natural resource:** A resource that has the following attributes: (a) It is a resource as described in the IPSASB's Conceptual Framework ("an item with service potential or the ability to generate economic benefits"); (b) It is naturally occurring; and (c) It is in its natural state (IPSASB, 2022).
- **nature-positive:** Nature-positive is the biodiversity equivalent of climate change's net zero concept. Nature positive implies "no harm to nature" and "positive outcomes overall for people, climate and nature" as well as actions such as "identifying ways to account for nature in economic and financial planning and decision-making" (G7, 2021; see also Reuters, 2022).
- **Taskforce on Nature-related Financial Disclosures (TNFD):** A global task force, funded by the United Nations, governments, and philanthropic foundations, consisting of 40 members representing financial institutions, corporate and market service providers worldwide, whose mission is to develop and deliver a risk management and disclosure framework for organizations to report and act on evolving nature-related risks (TNFD, n.d.).

Natural capital for the public and private sectors

Natural capital plays a crucial role in helping public and private sector organizations deliver value. This can include a municipal government delivering a specific level of service to its citizens, such as clean water through watershed restoration or urban heat reduction using tree canopies, or a company helping to finance community resilience via the construction of an engineered wetland for flood control or wastewater treatment.

Public sector

The Town of Gibsons just north of Vancouver is one of the most cited case examples in Canada, and for good reason. The town's administrators have blazed a trail for the integration of natural assets into finance planning and reporting to help improve municipal service delivery, including understanding the value of natural assets, making better use of them, and maintaining them over time. For example, the town's groundwater aquifer "provides water storage and filtration, while delivering drinking water so pure it meets health standards without chemical treatment", while its creeks and woodland areas help manage stormwater, and its foreshore coastal area acts as a natural seawall (Municipal Natural Assets Initiative (MNAI, n.d.)).

Among these natural assets is a series of constructed and natural ponds in the White Tower Park, where economic estimates peg the value of stormwater storage to the municipality at between \$3.5-\$4 million based on replacement cost (Eyquem et al., 2022). The Town of Gibsons includes the White Tower Park Pond design and construction in its five-year general capital budget and has integrated costs associated with the ongoing operation and maintenance of its natural assets into its annual operating budget (MNAI, 2019). However, despite the direct value this natural asset brings to the town in the form of a targeted infrastructure service, Gibsons' finance administrators can't reflect the asset on its balance sheet.

The potential consequences of not being able to recognize natural assets on balance sheets are many. For instance, any degradation of such assets over time could become an undocumented liability and present an incomplete picture in a municipality's annual financial reporting. As well, with the value derived from natural assets excluded from the books, financial reporting can misrepresent the contribution of the assets to the municipal budget and potentially affect a municipality's ability to borrow over time to maintain natural assets (Eyquem et al., 2022).

However, some progressive municipalities have found ways, under the current accounting standards, for users of the municipality's financial statements to gain insights on the value and contribution of natural assets. The Town of Gibsons has added a Note to the financial statements in its 2021 Annual Report, highlighting that "The Town is fortunate to have many natural assets that reduce the need for engineered infrastructure that would be otherwise be required." The Note goes on to state, "The Town's ability to provide services is dependent on the ability of these assets to withstand the impacts of climate change and to continue to perform as required. Recognizing the importance of this, the Town is investing in natural assets to increase resiliency to climate change". The Note is included in the *Significant Accounting Policies* section under *Tangible Capital Assets* (Town of Gibsons, 2021).

Valuing natural infrastructure in Ontario's Greenbelt

In 2019, The Greenbelt Foundation and Anielski Management Inc., in partnership with the Conservation Authorities of Toronto and Region, Hamilton, and Kawartha, analyzed the economic potential of three natural asset restoration projects in Ontario's two million acre protected Greenbelt.

Saltfleet Conservation Area (Hamilton)

A creek and wetland restoration project was proposed by the Hamilton Conservation Authority to help mitigate flooding by keeping water on the landscape following significant storm and run-off events. Other co-benefits identified as part of the proposed Saltfleet Conservation Area included recreational opportunities, biodiversity, carbon sequestration, water quality provision, and nutrient regulation. The 50-year net present value of these multiple benefits was estimated at between \$24-\$44 million. The projects capital cost of \$15 million was also significantly less than a grey infrastructure alternative solution estimated to cost \$28 million.

Brock Lands Restoration Project (Toronto and Region)

The Toronto and Region Conservation Authority developed a plan to restore 400 hectares of land at the former Brock Landfill to deliver a range of services to the surrounding communities. The 50-year net present value of ecosystem services provided by the restoration was estimated at between \$60 and \$92 million based on its recreational benefit and a suite of co-benefits from the restored wetlands, meadows, and forests (e.g., flood control, water regulation and erosion control, nutrient removal, pollination, and habitat). With the estimated 50-year net present value of capital and operating costs at around \$8 million, the project represents a very positive return on investment.

Lake Scugog Enhancement Project (Kawartha)

In an effort to address high sedimentation, invasive vegetation, and eutrophication of Lake Scugog northeast of Toronto, The Kawartha Conservation Authority created a plan to enhance the lake's ecosystems while at the same time provide support for the local tourism and recreational economy. While the 50-year net present value of the local plan was approximately \$2 million short of its projected cost, the value of ecosystem services provided by the overall 54,000-hectare Lake Scugog watershed was estimated at \$220 million per year.

Source: (Greenbelt Foundation, 2019)

Private sector

Private sector companies are also taking advantage of natural assets and natural infrastructure to increase the efficiency of operations and deliver services at reduced costs, while at the same time provide other local environmental and social co-benefits. For example, Calstone Inc., a steel-based furniture manufacturer in Ontario, installed a rain garden and rainwater harvesting system at its manufacturing facility to reduce runoff to the city storm sewer system (Toronto and Region Conservation Authority, 2020). The company rerouted its roof downspouts to a system of Low-Impact Development rainwater harvesting tanks connected to four infiltration ponds constructed on site. This urban natural infrastructure solution diverts 1.8 million litres of rainwater from the city storm sewer system annually, with the ponds also serving as a recreational area for its employees.

In another example, Dow Chemical required upgrades to wastewater treatment processes at one of its Texas-based petrochemical facilities to remain compliant with the Environmental Protection Agency regulations. Rather than build a new wastewater treatment plant at an estimated cost of USD \$40 million, executives at Dow approved development of an engineered wetland with an initial start-up cost of USD \$1.4 million (Dow, n.d.).

In an analysis conducted almost 25 years after its construction, Dow estimated that in addition to the original cost avoidance of almost USD \$40 million, its natural infrastructure solution proved so efficient at reducing the pH of its effluent that they no longer had to use chemical treatment, reducing annual operation costs by around USD \$100,000 per year (Dow, n.d.).

As well, beyond achieving its intended performance for wastewater treatment, Dow's engineered wetland has delivered other environmental and social co-benefits (Dow, n.d.). For example, energy consumption was reduced given that built infrastructure components such as pumps, lighting, and cooling and heating systems were not required. The natural infrastructure components have also enhanced drought resilience for the system of wetlands in the area. The site now supports a variety of wildlife including fish, alligators, nutria, raccoons, bobcats, wild hogs, deer and produces the highest bird counts in the area, making it a recognized stop in the local Christmas Bird Count.

Frameworks and methods for valuing natural capital

Estimating the economic value of natural capital embodied in ecosystems is a growing practice in Canada and internationally. For example, [Anielski and Wilson \(2009\)](#) reported on a two-year study to “identify, inventory, and measure the full economic value of the many ecological goods and services provided by Canada's boreal region”. They estimated the total non-market value of boreal ecosystem services at \$703 billion, which is 13.8 times greater than the net market value of boreal natural capital extraction. In an urban context, the City of Calgary undertook a valuation study of its natural assets in 2021, demonstrating a range of ecosystem service benefits in the range of \$2.5 billion annually, including for recreation, amenity and enjoyment, habitat, water retention, urban heat reduction, and carbon storage ([City of Calgary, 2021](#)).

Framing concepts

Most valuation exercises of natural assets and natural infrastructure are undertaken within a total economic value (TEV) framework. TEV is comprised of use value and non-use value (Figure 1). Use value can be further categorized into: (i) direct use value, which can be either consumptive or non-consumptive; (ii) indirect use value; and (iii) option value, representing the value derived by an individual for the option to use the asset at some future time. Non-use value is less tangible and may include: (i) existence value, derived from knowing that an asset exists regardless of any use; (ii) altruistic value, derived from knowing that others of the present generation can use; and (iii) bequest value, derived from knowing that future generations can use the asset. Thus, the total economic value of a natural asset reflects multiple values, both tangible and intangible.

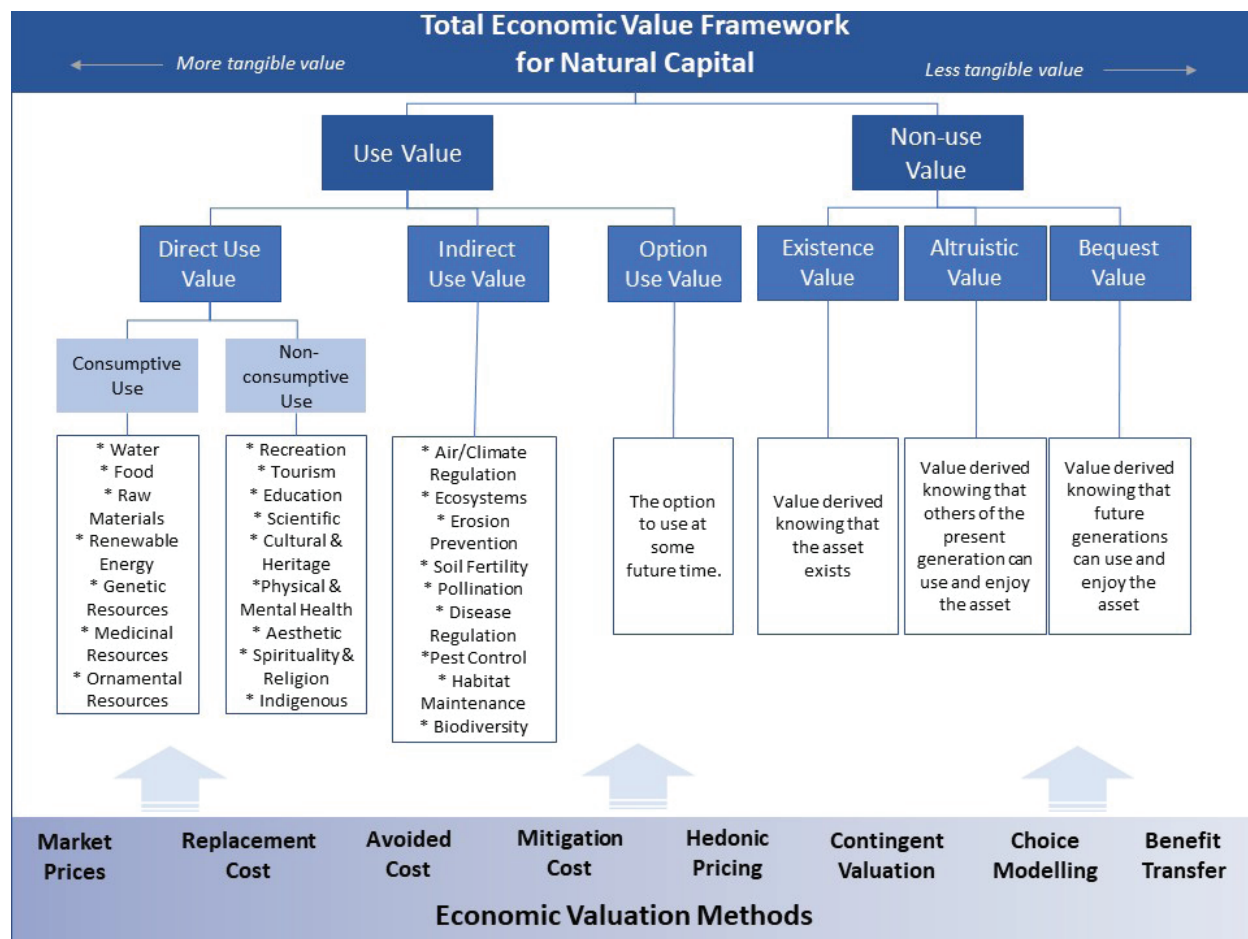


Figure 1: Synthesis of total economic value frameworks and methods

Based on: *Value of Nature to Canadians Study Task Force (2017)*; *Pascual and Muradian (2010)*, *Wilson (2010)*, *Anielski and Wilson (2009)*

Methods

A range of methods have been developed and applied over the years to estimate the TEV of natural capital. Select methods are shown along the bottom of Figure 1, corresponding to the spectrum from the more tangible values on the left side of the diagram to the less tangible values on the right side.

Select methods for valuing natural capital

- **market prices:** Direct valuation based on market prices; for example, net present value of harvested timber.
- **replacement cost:** The cost of obtaining the good from another source; for example, estimating the value of water in the watershed.
- **avoided cost:** The cost that would have been incurred in the absence of ecosystem goods or services. For instance, the value of flood control services of a wetland can be derived from the estimated damage if flooding were to occur.

- **mitigation cost:** Estimating the cost of preventive expenditures, such as flood control structures in the absence of similar control provided by a wetland.
- **hedonic pricing:** Estimating the intrinsic value of natural assets derived from observed market behaviours; for example, an increase in the price of real estate owing to enhanced aesthetic views or recreational opportunities provided via urban parklands, wetlands, or tree canopies.
- **contingent valuation:** Estimating the value of natural assets based on a survey method in which respondents are asked to state their preferences in hypothetical scenarios; for example, surveying the willingness to pay for biodiversity conservation.
- **choice modelling:** Using experimental methods such as choice experiments, contingent ranking, or rating, to assess consumer preferences based on hypothetical scenarios. Statistical models are used to estimate the value of natural assets based on the respondents' preferences, collected by a survey method, and other experimental data.
- **benefit transfer:** Using estimates of value from one location, obtained by any method, and applying it to another location with similar characteristics.

Source: Based on [Pascual and Muradian \(2010\)](#) and [Pagiola \(1996\)](#).

On the more tangible end of the spectrum, the market prices method can be used to estimate the consumptive direct use value of natural assets; this method is particularly effective for physical and measurable resources, such as water, food, raw materials, or energy. Market pricing may also be applicable in certain situations for non-consumptive direct use values, such as recreation and tourism where entrance fees to a natural site exist. For other natural assets with use value, including ecosystems and biodiversity, several valuation methods are available, including estimating the replacement cost, avoided cost, or mitigation cost. The choice of the valuation method usually depends on the type of available data and on the cost of implementing the method.

Estimating the non-use value is more complex and costly. Hedonic pricing, contingent valuation, and choice modelling are the methods that rely on various statistical and experimental techniques, usually based on data collected from surveys. For example, one way to estimate the value of a natural asset is to survey the willingness of respondents to pay for its conservation and the services that it delivers. The choice of the method may also depend on the physical location of the asset. The benefits transfer method is not a valuation method in and of itself, but rather represents the use of economic values estimated for a natural asset in one location, where data is available, by any appropriate method, that are applied to a comparable asset in a different location, where data is not readily available.

The CPA's role

Using an array of valuation methodologies and guidelines on nature-related disclosures, CPAs can help public and private sector organizations in their planning and reporting phases. What gets reported, gets managed. What gets valued, gets done. CPAs can build the business case for leveraging natural assets to deliver cost effective services that not only enhance community and corporate resilience, but also generate nature-positive results for the environment.

Nature is high on the agenda of regulators and standard setters. It is only a matter of time until disclosures on ecosystems, biodiversity, and other natural assets become a habitual exercise in the public and private sectors. It is not the question of whether, but when. The time is right for CPAs to learn the new way to appreciate and account for nature. Listed below are five core questions to consider in helping your organization, or that of your clients, to leverage the potential of natural capital:

1. ***How reliant is the organization on natural assets, either directly or indirectly, to achieve objectives and deliver value?*** For instance, are value chains and supply chains impacted by deterioration of natural assets?
2. ***Can existing natural assets or newly built natural infrastructure help the organization achieve its objectives and deliver value in a more cost-effective and sustainable manner?***
3. ***Have you considered the full range of potential environmental, social and economic co-benefits that can be delivered by natural assets and natural infrastructure?***
Such 'benefit stacking' contributes to a well-informed and comprehensive business case, and can help enhance resilience and reduce carbon emissions.
4. ***How robust is the organizations Enterprise Risk Management and Business Continuity Planning?*** The physical, transition, and reputation risks posed by climate change can be material to the organization. Natural assets and natural infrastructure can play an important role in enhancing corporate and community resilience.
5. ***Are you staying abreast of regulatory developments relating to the integration of natural assets in financial reporting?*** Staying abreast of standards, guidelines and reporting frameworks will keep you ahead of the game. These include, but are not limited to, any forthcoming or potential standards and guidelines from the ISSB, IPSASB and other regulatory bodies, as well as voluntary reporting initiatives, such as the TNFD or the Capitals Coalition, as precursors to standards and guidelines.

Additional resources

[DRAFT] IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information

[DRAFT] IFRS S2 Climate-related Disclosures

IPSASB Consultation Paper on Natural Resources

Natural Capital Protocol, Capitals Coalition

Taskforce on Nature-related Financial Disclosures

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