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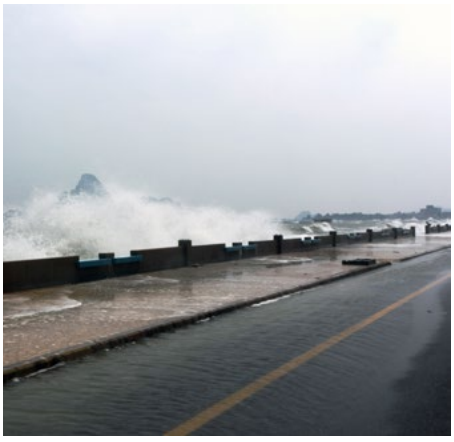
Ecosystem Services Footprinting Tool

Within the Taskforce on Nature-Related Financial Disclosures (TNFD) framework[1] and the LEAP approach[2] to assessing nature-related risks and opportunities, this tool is especially useful in the "Locate" and "Evaluate" phases. With user-provided asset locations, it can identify where a company or portfolio interfaces with nature and the direct impacts of physical assets on ecosystem services



Overview

This free, open-source Ecosystem Services Footprinting Tool ("the Tool") provides rapid assessments of an asset, company, or portfolio's impacts to nature and the benefits nature provides to people, using global high-resolution maps of ecosystem services. The Tool measures impact on four types of ecosystem services, focusing on the direct (or Scope 1) impacts from assets. It integrates information on ecosystems' biological and physical processes with the number of people potentially benefiting from:

- **Coastal risk reduction:** coastal habitats (such as wetlands and mangroves) reduce risks of erosion and flooding from storms for people living near the coast
- **Clean water (via sediment retention):** vegetation on slopes and along waterways keeps sediment from eroding and polluting surface water, providing downstream populations with clean water for drinking, recreation, and other benefits
- **Clean water (via nitrogen retention):** vegetation traps nitrogen runoff from agricultural fields and other activities, preventing nutrient pollution and providing clean water to downstream populations
- **Nature access:** having access to natural lands provides numerous direct and indirect benefits to people, such as recreation, hunting and gathering, visual beauty, mental and physical health, cultural and traditional value, and sense of place.

The Ecosystem Services Footprinting Tool is built on the Natural Capital Project's InVEST® ecosystem service models.[3] InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) is a suite of free, open-source software models used to map and value the goods and services from nature that underpin economic activities and human well-being. Designed by scientists and software engineers working closely with decision-makers, InVEST has been used in more than 185 countries worldwide and 600 peer-reviewed scientific publications. InVEST models bring together high-resolution spatial information on ecosystems, climate, and other variables with transparent algorithms that explicitly quantify where and how nature provides benefits to people.

The Tool provides the following capabilities:

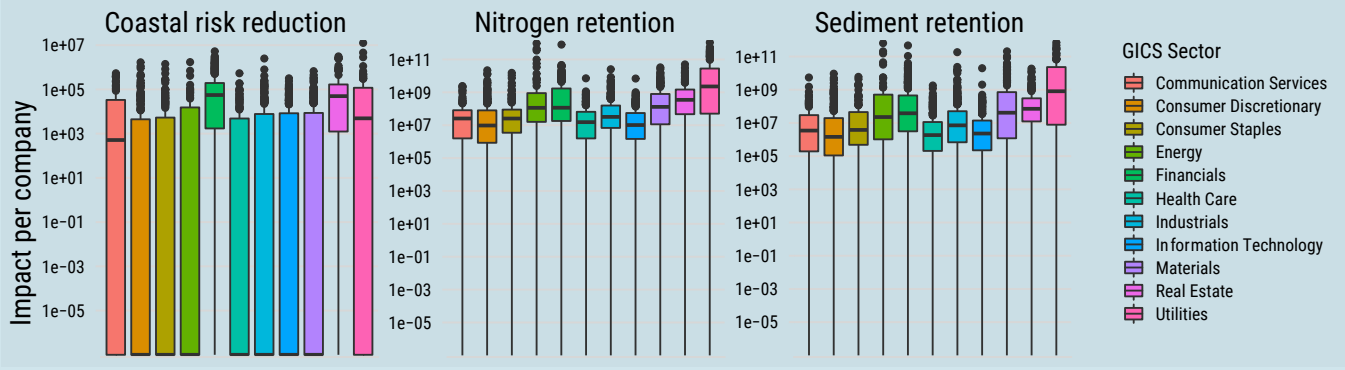
- **Identifying location-specific ecosystem service impacts**
  There are several ways users can assess impact, depending on data availability and intended use. The Tool can be run with user-defined asset locations (latitude and longitude) to compare ecosystem service values. It can provide even more detailed estimates of impact if information on asset size or detailed asset footprints (such as from satellite imagery) are available. In addition, the Tool flags assets located in the most critical ecosystem service areas, which can then be reviewed in more detail if desired. Asset-level measures of impact can be examined over time or aggregated to measure impacts at the level of a company, sector, or portfolio.

- **Identifying company or portfolio ecosystem services impacts**
  The Tool can rapidly calculate impacts for a large number of assets and roll up these metrics to the level of a company or portfolio. This information can be used to quantify total impacts or compare among assets, sets of assets, companies, or portfolios. This could be used by public equity, private equity, corporate credit, project and infrastructure investors to screen companies based on their absolute level of impact, impact relative to revenue, or other performance metrics. It could also be used by companies making project- or asset-level decisions.

- **Enhanced analysis at the asset level**
  Where asset-specific information about footprint size is available, the Tool provides an even more detailed evaluation of asset impact. This information can be adjusted by user-provided production or revenue data to identify ecosystem service impacts relative to production benefits.

  For assets with changing footprints, like mines, these impacts can also be evaluated over time. These changes in size can greatly affect the assets' impact on ecosystem services. Capturing this level of granularity can help project developers and investors explore the impact of an asset over time and analyze whether a possible increase in negative impacts due to an increase in asset size is justified by a meaningful increase in production.

Variation in impacts across companies in the MSCI ACWI Index, grouped by GICS sector, as assessed by the Ecosystem Services Footprinting Tool for three ecosystem services (coastal risk reduction, nitrogen retention, and sediment retention). Company impacts are based on over 580,000 mapped assets* with higher values indicating greater impacts. Impacts are affected by the number and size of assets attributed to each company and the assets' locations relative to hotspots of ecosystem service provision. The values for each metric should be interpreted as indices with values that are comparable within an ecosystem service but not between services. Note the log scale of y-axes.

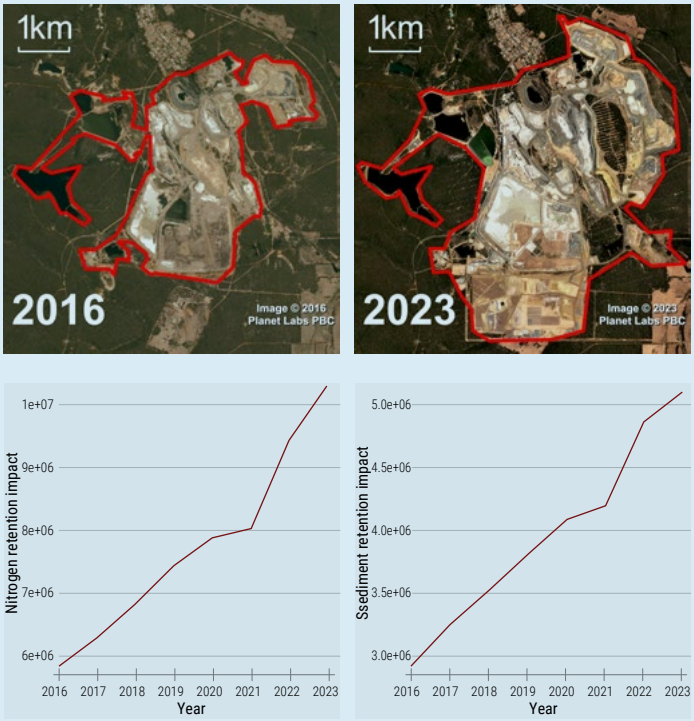


* Asset data copyright © 2022, S&P Global Market Intelligence

Additional considerations:

- The Tool and four ecosystem service data layers are free and open access for any use, including for commercial purposes. The Tool must be run from the command line, and outputs can be viewed in spreadsheets and/or mapping software.
- Users must provide, at a minimum, the latitude and longitude of asset locations. If information on footprint area or specific asset footprints is available, the Tool will calculate impacts for the area associated with each asset. The Tool also provides an estimated average footprint size for a range of activities, which can be linked to user-provided asset locations.
- The Tool evaluates impacts from the losses of ecosystem services directly from assets (equivalent to Scope 1 impacts). Impacts are evaluated relative to a baseline scenario with natural vegetation.

As the lithium mine shown here expanded over time (top panels), the transformation of the landscape is associated with increased impacts to nitrogen retention and sediment retention services (bottom panels). From 2016 to 2023, the mine's physical footprint increased 75 percent, while impacts to nitrogen retention and sediment retention increased over 80 percent. The mine footprint was evaluated with satellite imagery, and the ecosystem service impacts were quantified with the Ecosystem Services Footprinting Tool.



1 https://tnfd.global/
2 https://framework.tnfd.global/leap-the-risk-and-opportunity-assessment-approach/
3 https://naturalcapitalproject.stanford.edu/software/invest

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About the Natural Capital Project

The Natural Capital Project is an interdisciplinary team of researchers, software engineers, and other professionals working to make valuing natural capital easier and more accessible to everyone. With our global hub at Stanford University, the Natural Capital Project is a collaboration among academic partners including the Chinese Academy of Sciences, the Royal Swedish Academy of Sciences, the Stockholm Resilience Centre, and the University of Minnesota, with core implementing partners including The Nature Conservancy and World Wildlife Fund.

Morgan Stanley
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This tool was developed with the support and partnership of Morgan Stanley's Institute for Sustainable Investing

For more information about the Ecosystem Services Footprinting Tool

Download the Tool from
https://github.com/natcap/natural-capital-footprint-impact

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