

Nature disclosure

Timberland and agriculture 2023

Aligned with the recommendations of the
[Taskforce on Nature-related Financial Disclosures](#)



What you'll *find*

Opening statement and scope of disclosure	3
Section 1: General requirements	5
The application of materiality	6
The location of nature-related information	8
Integration with other sustainability-related disclosures	10
The time horizons considered	10
Stakeholder engagement	11
Section 2: Recommended disclosures	12
Governance	14
Strategy	16
Risk and impact management	19
Metrics and targets	20
Appendix I	21
Core global disclosure metrics	22
Proposed forestry sector core disclosure indicators and metrics	24
Proposed additional forestry sector disclosure indicators and metrics	24
Proposed food sector core disclosure indicators and metrics	25
Proposed additional food sector disclosure indicators and metrics	26

All information as of December 31, 2022, unless otherwise indicated.

Opening statement and scope of disclosure

We're proud to present Manulife Investment Management's inaugural timberland and agriculture nature disclosure informed by the recommendations of the Taskforce for Nature-related Financial Disclosures (TNFD). Although the TNFD is a new initiative, the themes in this report aren't new to us. As a responsible steward of timberland and farmland for over 30 years, and a producer of sustainable food, fiber, and solid wood products, we've always been committed to meeting our clients' investment objectives while conducting our business in a way that maintains and enhances our environment, nourishes our communities, and empowers our people.

We've supported the TNFD from its early stages: first as members of the informal working group tasked with establishing the detailed work plan for the TNFD¹; then by becoming members of the TNFD Forum and contributing to the development of the TNFD recommendations. We welcomed the release of the final TNFD recommendations in September 2023, and we've prioritized issuing this voluntary disclosure to further demonstrate our commitment to nature and our support for the framework.

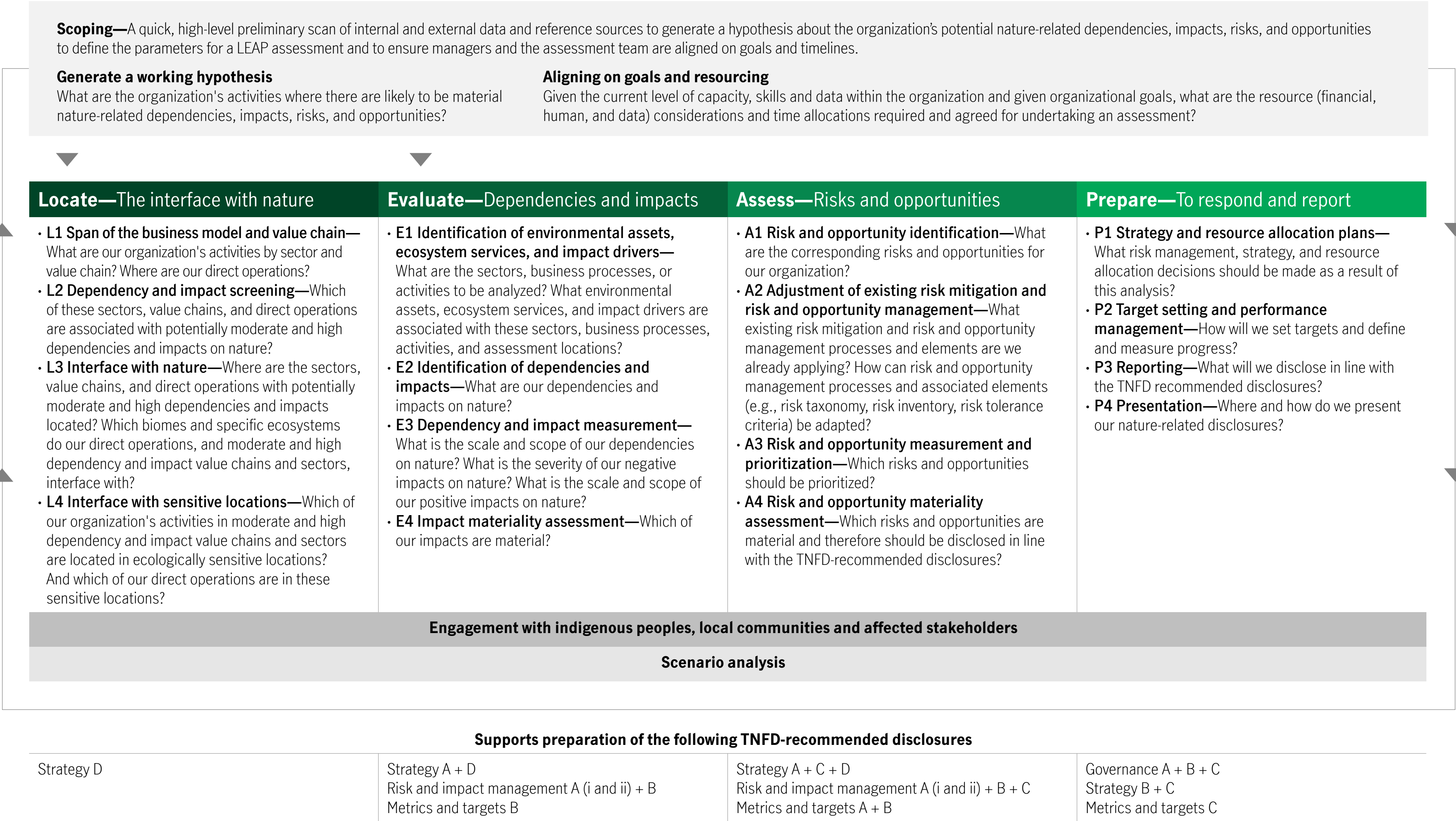
To that end, our inaugural TNFD disclosure explains how we operate and shares our progress while acknowledging that we still have work to do. The scope of the disclosure includes our timberland and agriculture businesses and the activities within those businesses that are within our direct operational control.² We address timberland and agriculture both separately and together, but in either case make it clear what our commentary applies to.

In section 1, we address the TNFD general requirements of materiality, location, integration, time horizons, and stakeholder engagement. These apply to our entire disclosure.³ In section 2, we address the TNFD-recommended disclosures of governance, strategy, risk and impact management, and metrics and targets. For metrics and targets, we disclose what is material with the information we have available, and we note where we're still working to close information gaps. Our disclosure has been informed by the TNFD's LEAP approach, an integrated method that the TNFD has developed for the identification and assessment of nature-related issues (LEAP approach diagram shown on the following page).

We think our first TNFD disclosure is a milestone worth celebrating, but we're not treating it as a finish line. We'll continue seeking improvement both in our reporting and our operations and expect to share more over time.

¹ [unepfi.org/themes/ecosystems/tnfd-launch](https://www.unepfi.org/themes/ecosystems/tnfd-launch). ² Refer to the [TNFD glossary](#) for definitions of terms used in this disclosure. ³ tnfd.global/recommendations-of-the-tnfd/#requirements.

Locate, evaluate, assess, and prepare: defining the LEAP approach



Section 1:

General requirements

The major headings in this section directly correspond to the general requirements in the [TNFD recommendations](#).

The application of materiality

Across both timberland and agriculture, our stewardship approach focuses on three core thematic considerations: climate, nature, and people.

These themes are the evolution of a third-party [materiality assessment](#) we commissioned in 2018 to identify and prioritize the environmental, social, and governance (ESG) issues with the most relevance to our business. We consider climate, nature, and people throughout the cycle of an investment, from due diligence early in the investment process to delivery of our integrated property management services (including both direct property operation and oversight of farmland lessees), throughout our clients' ownership of the property.

Materiality in our investment process

Since 2021, we've used a proprietary question-based tool co-developed in house by our sustainability, acquisitions, and operations teams to identify, assess, and score ESG components of every deal we consider. We call this our sustainability tool kit. Areas of assessment in the tool kit are derived from certification, [Equator Principles](#), and International Finance Corporation performance standards.

This tool kit highlights both potential risks and opportunities, and it enables us to quantify risk through stoplight indicators we use to rate inherent risk, risk mitigation potential, and residual risk. We then aggregate these upward to produce an overall numerical sustainability score for the asset, which can be used in our underwriting. The completed tool kit assessment is provided in every deal package presented to our natural resource investment committee to ensure that investment decisions explicitly consider relevant sustainability risks, and opportunities.

Together with our [deforestation policy](#), [carbon principles](#), and carbon tool kit (used specifically for forest carbon project evaluation), this approach is designed to systematically consider all identified material sustainability considerations in our investment process.

Sustainable investing considerations

Climate

- Climate change impacts
- Emissions
- Deforestation
- CO₂ sequestration



Nature

- Sensitive lands
- Protected areas
- Biodiversity
- Threatened and endangered species
- Mitigation banking
- Water quantity/quality



People

- Health and safety
- Training and development
- Labor practices
- Human rights
- Community relations
- Indigenous peoples
- Job creation
- Research, internships



This list is illustrative of the types of sustainable factors we may consider in our investment process. It is not exhaustive and sustainable investing considerations will vary depending on the particular asset.

Materiality in our operations

Operational risk management assessments support and inform our asset management decisions. Material considerations are applied at the forest and farm level and integrated into property management. Assessments are updated and implemented by timberland and agriculture operations staff at a regional level.

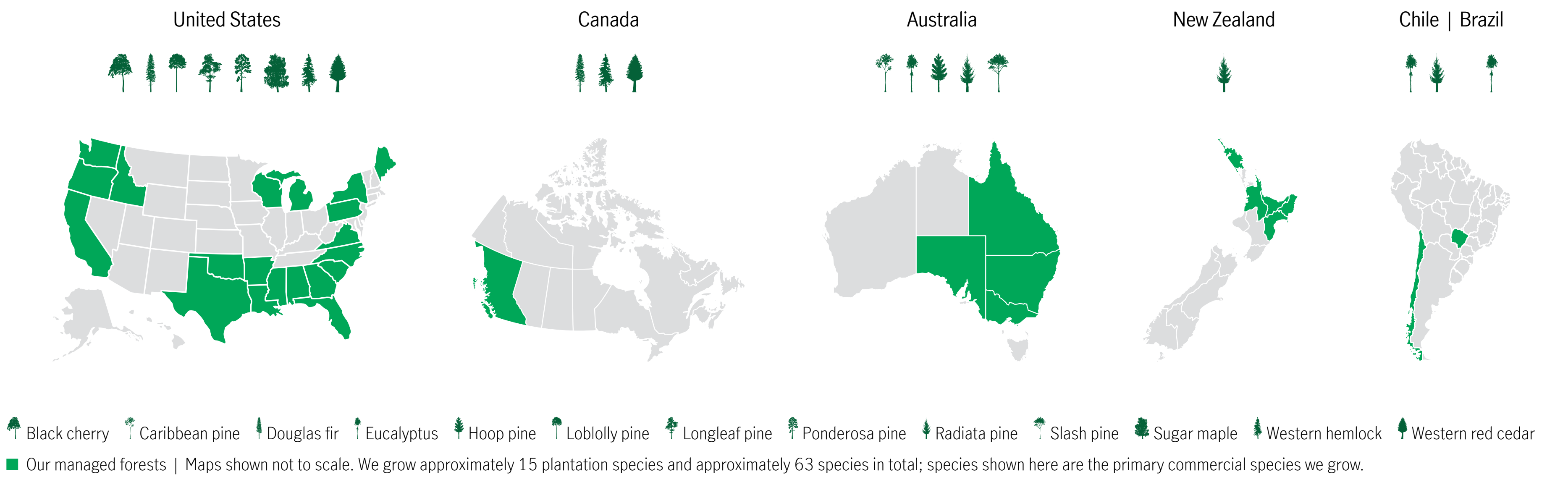
We regularly talk about certification because we believe that independent third-party sustainability certification is a comprehensive mechanism for credibly demonstrating sustainable asset management and, critically, it provides independent assurance to our stakeholders that we're operating sustainably. As of December 31, 2022, 100% of our managed forests were certified under either the Sustainable Forestry Initiative® (SFI) or Forest Stewardship Council® (FSC),⁴ and some of our forests in Australia and New Zealand carry dual FSC and Programme for the Endorsement of Forest Certification (PEFC) accreditation. In agriculture, 100% of our U.S. farmland investments were certified in June 2022 to the Leading Harvest Farmland Management Standard by a third party,⁵ and our Australian agriculture investments participated in a pilot program to launch Leading Harvest in Australia (as of mid-2023, our Australian agriculture assets are being enrolled in Leading Harvest, and we're engaged in a Leading Harvest pilot in Canada). Some assets have been certified to additional agriculture standards on a case-by-case basis, including GLOBALG.A.P., USDA GAP, LODI RULES, and SAI-FSA. Overall, 223 of the 245 properties (91%, or approximately 80% of our agriculture assets under management) in our global agriculture investment portfolio carried one or more third-party certifications. As Leading Harvest establishes programs in other countries in which we operate agriculture assets, including Australia, Canada, and Chile, we also intend to seek this certification.

⁴ As of December 31, 2022, 100% of our forests were certified under either SFI (3.2 million acres in the United States and Canada) or FSC (2.2 million acres in Australia, New Zealand, Brazil, and Chile). Most current data shown. ⁵ Certification as of June 2022, by Leading Harvest and is based on an annual assessment of the conformation to the Farmland Management Standard. Most current data shown. Manulife Investment Management's timberland and agriculture team (then operating as Hancock Natural Resource Group) is a founding member of Leading Harvest. In addition, Oliver Williams, global head of agriculture, is current chair of the board of directors for Leading Harvest. For more information on Leading Harvest, please see leadingharvest.org/about.

The location of nature-related information

We work in and with nature every day, in forests and farms around the world, and we strive to understand these real assets deeply. The properties we manage are located in six countries: Australia, Brazil, Canada, Chile, New Zealand, and the United States.

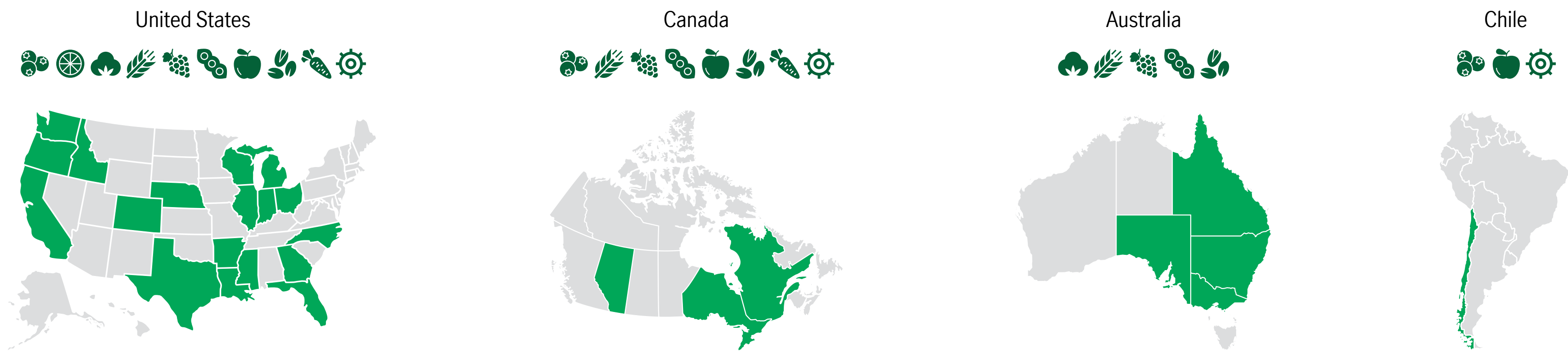
Timberland locations



Category	United States	Canada	Australia	New Zealand	Chile	Brazil	Total
Assets under management (USD million)	\$6,118	\$57	\$2,323	\$2,181	\$310	\$80	\$11,069
Acres (thousands)	3,151	49	1,362	522	180	138	5,402

Source: Manulife Investment Management, as of December 31, 2022.

Agriculture locations




 Berries (blueberry, cranberry)  Citrus  Cotton  Grain (barley, canola, corn, rice, wheat)  Grapes  Legume (alfalfa, beans, peanut, soybean)  Tree fruit (apple, cherry, kiwi, nectarine, olive, pear)

 Tree nut (almond, pistachio, walnut)  Vegetable (potato, vegetables)  Processing

 Our managed farms | Maps shown not to scale.

Category	United States	Canada	Australia	Chile	Total
Assets under management (USD million)	\$3,344	\$196	\$528	\$117	\$4,185
Gross acres	284,413	23,202	87,695	2,570	397,880

Source: Manulife Investment Management, as of December 31, 2022.



The independent third-party sustainability certification standards under which we operate set strict criteria for nature and biodiversity relevant to the country-specific contexts of our operations. Where these frameworks don't yet exist, we set high standards for ourselves informed by existing frameworks in other locations.

Across both our timberland and agriculture businesses, accurate location data is pivotal in meeting these standards. In our timberland business, our team of senior resource and technology professionals maintains a robust geographic information system (GIS) to ensure the data and maps are current. Biodiversity information is recorded locally into our GIS and informs local timber operational plans. In this way, nature-related information resides closest to where it's needed for outcome delivery.

In our agriculture business, we're increasingly using spatial analysis to provide important nature-related information that informs our asset management. For example, on some farms we're beginning to use technology that allows us to monitor change in soil organic carbon stocks over time.

Biodiversity information captured at the individual forest and farm level includes locations of threatened and endangered species and their habitats, locations of cultural significance, and areas of high conservation value that are set aside from operations. Our GIS data originates from several sources, including:

- Internal databases of occurrence data
- State/province natural heritage programs
- Field reconnaissance
- High-resolution imagery

Taken together, this constitutes a significant amount of data. Going forward, we'll be charting a plan to centralize this information for global reporting purposes. Our locational knowledge is detailed, as evidenced by our consistent achievement of third-party certifications. Our local knowledge and on-the-ground presence in locations where we operate is a strength of our business model and helps us as we strive to ensure that our commitment to sustainability carries through from investment strategy to local execution.

Integration with other sustainability-related disclosures

This is our first report that follows recommendations of the TNFD, and we've chosen to release it as a stand-alone document. While we're proud to issue this report on its own, we intend to integrate the TNFD recommendations into our broader sustainability reporting in the future.

The time horizons considered

Long-term thinking is fundamental to timberland and agriculture investment management. Since the inception of our business, sustainability has been embedded in our operations. We believe that good stewardship is good business and our experience operating timberland and farmland assets over the past 30 years has shaped and refined our ability to manage sustainably over extended time horizons.

Our financial models and asset management plans are forecast over 50 years for timberland, while for agriculture we typically look 10 to 30 years ahead, depending on the type of asset. We do our best to plan for multiple possible futures through climate scenario analysis and informed by climate research at the Massachusetts Institute of Technology, University of California-Davis, and other institutions. In 2022, we acquired a tool that enables us to conduct scenario analysis across our entire portfolio. We're currently working on integrating the information it provides into our planning.

Stakeholder engagement

As managers of real assets, we have a multilayered approach to stakeholder engagement; we engage at the local level, at an investment level, and at an industry level.

Local engagement

On the ground at forest and farm level, we regularly engage with our neighbors, local communities, indigenous peoples, and other stakeholders. This engagement is both formal and informal, and our teams are organically part of the communities in which we operate.

Certification requires us to have processes in place to provide for and record engagement with local stakeholders. FSC, SFI, and Leading Harvest all contain provisions that ensure the rights of local communities and indigenous peoples are upheld and respected where our operations intersect with their interests.⁶ We seek opportunities beyond certification requirements and to partner with communities and indigenous peoples where we can. Some case study examples of this work have been published in our previous [sustainable investing reports](#) and in [stories from the field](#).

Investor engagement

We work with investors to promote awareness and increase their understanding of the climate and nature benefits of sustainably managed timberland and agriculture investments. We do this by:

- Inviting our investors to visit forests and farms we manage on their behalf
- Presenting to investors and responding to investor questions
- Annual sustainability reporting
- Attending and presenting at sustainable investment events and conferences
- Publishing thought leadership

Industry engagement

Collaboration is a cornerstone of our business. We recognize that we can't specialize in everything, and we seek to establish mutually beneficial relationships with organizations and companies that can complement our strengths and that have a similar culture and values. These relationships not only help us improve our sustainability performance, but they also reflect our conviction that when it comes to solving global challenges, we're all in this together. Below are examples of peer and industry associations that we support, actively participate in, or are a member of:

- American Bird Conservancy
- Farmland Capital Alliance
- Global Impact Investing Network
- Leading Harvest⁷
- MIT Joint Program on the Science and Policy of Global Change
- Michigan State University Forest Carbon and Climate Program
- National Alliance of Forest Owners (NAFO)
- Pollinator Partnership
- SFI
- Water Education Foundation
- World Business Council for Sustainable Development (WBCSD)

⁶ See pages 9 and 10 of both our [timberland and agriculture 2022 sustainable investing reports](#). For further information, see: [leadingharvest.org/standard](https://www.leadingharvest.org/standard), [forests.org/forestmanagementstandard](https://www.fsc.org/forestmanagementstandard), and connect.fsc.org/document-centre/documents/resource/392. ⁷ Manulife Investment Management's timberland and agriculture team (then operating as Hancock Natural Resource Group) is a founding member of Leading Harvest. In addition, Oliver Williams, global head of agriculture, is current chair of the board of directors for Leading Harvest. For more information on Leading Harvest, please see [leadingharvest.org/about](https://www.leadingharvest.org/about).



Section 2:

Recommended disclosures

This section follows the structure of the TNFD-recommended disclosures.

TNFD recommended disclosures

Governance	Strategy	Risk and impact management	Metrics and targets
Disclose the organization’s governance of nature-related dependencies, impacts, risks, and opportunities.	Disclose the effects of nature-related dependencies, impacts, risks, and opportunities on the organization’s business model, strategy, and financial planning where such information is material.	Describe the processes used by the organization to identify, assess, prioritize, and monitor nature-related dependencies, impacts, risks, and opportunities.	Disclose the metrics and targets used to assess and manage material nature-related dependencies, impacts, risks, and opportunities.
Recommended disclosures	Recommended disclosures	Recommended disclosures	Recommended disclosures
<p>A Describe the board’s oversight of nature-related dependencies, impacts, risks, and opportunities.</p> <p>B Describe management’s role in assessing and managing nature-related dependencies, impacts, risks, and opportunities.</p> <p>C Describe the organization’s human rights policies and engagement activities, and oversight by the board and management, with respect to indigenous peoples, local communities, and other stakeholders, in the organization’s assessment of, and response to, nature-related dependencies, impacts, risks, and opportunities.</p>	<p>A Describe the nature-related dependencies, impacts, risks, and opportunities the organization has identified over the short, medium, and long term.</p> <p>B Describe the effect nature-related dependencies, impacts, risks, and opportunities have had on the organization’s business model, value chain, strategy, and financial planning, as well as any transition plans or analysis in place.</p> <p>C Describe the resilience of the organization’s strategy to nature-related risks and opportunities, taking into consideration different scenarios.</p> <p>D Disclose the locations of assets and/or activities in the organization’s direct operations and, where possible, upstream and downstream value chain(s) that meet the criteria for priority locations.</p>	<p>A(i) Describe the organization’s processes for identifying, assessing, and prioritizing nature-related dependencies, impacts, risks, and opportunities in its direct operations.</p> <p>A(ii) Describe the organization’s processes for identifying, assessing, and prioritizing nature-related dependencies, impacts, risks, and opportunities in its upstream and downstream value chain(s).</p> <p>B Describe the organization’s processes for managing nature-related dependencies, impacts, risks, and opportunities.</p> <p>C Describe how processes for identifying, assessing, prioritizing, and monitoring nature-related risks are integrated into and inform the organization’s overall risk management processes.</p>	<p>A Disclose the metrics used by the organization to assess and manage material nature-related risks and opportunities in line with its strategy and risk management process.</p> <p>B Disclose the metrics used by the organization to assess and manage dependencies and impacts on nature.</p> <p>C Describe the targets and goals used by the organization to manage nature-related dependencies, impacts, risks, and opportunities and its performance against these.</p>

Source: Taskforce on Nature-related Financial Disclosures.



Governance

Our governance of sustainability is both deliberate and comprehensive. There are three key principles interwoven throughout our governance structure:

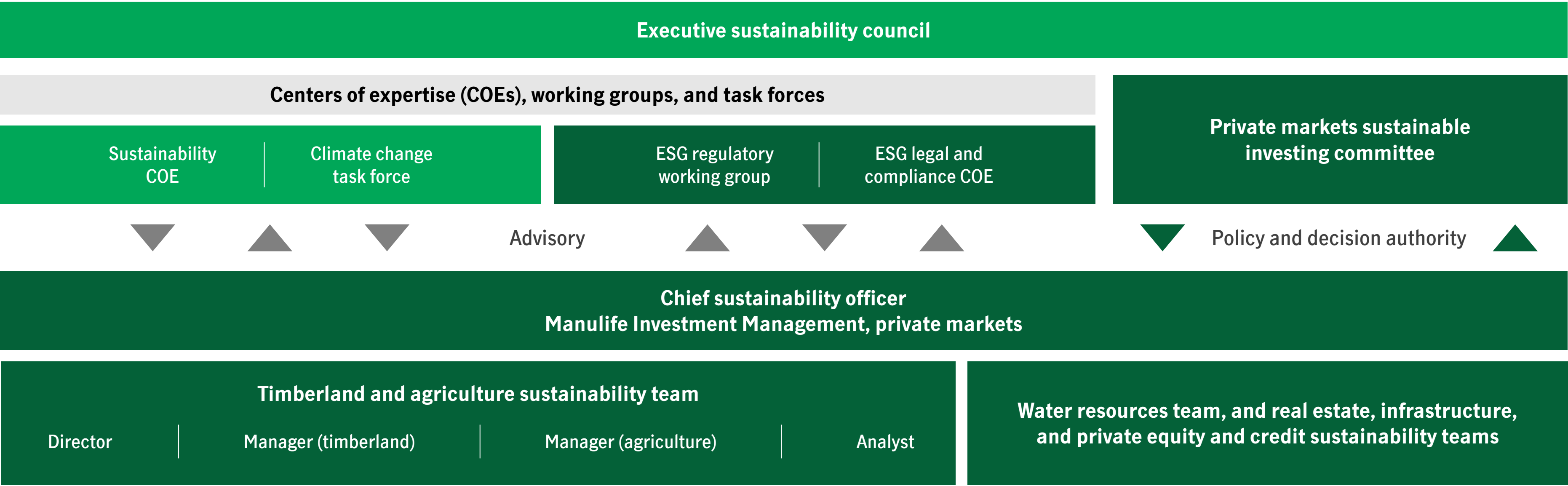
- 1 Integration within business verticals**
Integrating the sustainability team(s) with other relevant business verticals, including investments, legal and regulatory, marketing and communications, risk management, environmental and policy support, and operations teams
- 2 Subject matter expertise**
Channeling the subject matter expertise of sustainability professionals embedded within our business units to inform larger whole-of-company sustainability decisions
- 3 Global resources**
Leveraging the resources of Manulife's global sustainability team to provide coherence to, and aid in the execution of, our sustainability strategy at an operational level

Governance disclosures A and B

The structure of sustainability governance for our timberland and agriculture businesses shows how it fits under the broader umbrellas of Manulife Investment Management and Manulife Financial Corporation sustainability governance. An explanation detailing our sustainability governance structure can be found on pages 6 and 7 of our [timberland and agriculture 2022 sustainable investing reports](#). This structure and the governance responsibilities of management are the same for all relevant sustainability issues, including nature, climate, and people.

Our governance of sustainability

■ Manulife ■ Manulife Investment Management



As of December 31, 2022.

Governance disclosure C

Our approach to respecting and promoting human rights is guided by the UN Guiding Principles on Business and Human Rights, as documented in Manulife’s [human rights statement](#) and [vendor code of conduct](#) as well as in our [indigenous peoples’ policy](#) and [responsible contracting statement](#).



Strategy

We view nature as our business. The forests and farms we manage are ecosystems, and our job is to keep them healthy and productive over the long term. We aim to manage our clients' timberland and agriculture investments so that they sustainably meet client objectives and basic human needs for food, fiber, and shelter, while contributing to achieving the vision and mission of the Global Biodiversity Framework:

“A world living in harmony with nature where by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.”

Kunming-Montreal Global Biodiversity Framework

What that means in practice can be challenging to determine given the plethora of frameworks and initiatives that have evolved to spur companies toward action on nature (in collaboration with the Delphi Group, we produced a guide to these: the nature-positive ecosystem).

As members of the WBCSD, in 2022, we co-led a project with other forest sector companies to develop the Forest Sector Nature-Positive Roadmap, which details how the forest sector can contribute to a nature-positive future.

Strategy disclosure A

On the forests and farms we manage, we're constantly making short-, medium-, and long-term decisions based on risk assessments, market activity, and environmental health. It'll take time to translate our current approach into the language of dependencies, impacts, risks, and opportunities, and we'll do that as we work more thoroughly through the LEAP approach. We also plan to integrate the LEAP approach with natural capital accounting work that we're undertaking—work that's intended to help us be more explicit in the assignment of value to the ecosystem services provided by timberland and farmland assets as well as the operational practices we employ in their management.

Although it's not in the LEAP language,⁸ we've previously framed our consideration of nature using the lens of ecosystem services, which include provisioning services (such as timber and food), regulating services (such as climate regulation), cultural services (such as recreational opportunities), and supporting services (such as nutrient cycling). While we work on a full LEAP assessment, we've included an ecosystem services snapshot in what follows.

Timberland

- **Provisioning services**—We depend on the forest for provisioning services. The trees we harvest produce wood products, including lumber and fiber/pulpwood, which are transformed into building materials and everyday products (such as paper and hygiene products). Our goal with respect to these services is to sustainably maximize production, as the sale of wood products is usually the primary revenue-generating component of a managed forest. We manage the risks of our operational environmental and social impacts through sustainable management and by being third-party certified.
- **Regulating services**—We also depend on the forest for regulating services and understand the risk that society faces without them. Climate regulation is the most well-known of the regulating services provided by forests, which absorb carbon dioxide and breathe oxygen back into the atmosphere, mitigating the effects of climate change. Water cycle regulation is another service forests provide by filtering pollution and sediment out of water supplies, controlling rainfall, and attenuating floods, as explained by the [World Resources Institute](#) (WRI). We carefully manage the risk of our environmental and social impacts on these services. We keep our managed forests healthy so that they continue to sequester carbon, and we follow best management practices such as minimizing

stream crossings and maintaining generous buffers between watercourses and harvest areas so that the forests continue to provide water regulation services. As of year-end 2022, the forests and farms we manage removed approximately 2.1 million tonnes of CO₂⁹ from the atmosphere annually and protected approximately 20,000 miles of streams.¹⁰ In some cases where there's opportunity, we aim to maximize the climate regulation services of the forest through formal carbon projects in which carbon sequestration becomes a monetizable service.

- **Cultural services**—Visual amenities and recreational opportunities are two cultural ecosystem services that forests provide. We have procedures in place to assess our potential impacts on these services. We know others depend on cultural services within the forests we manage and we actively work to connect with those stakeholders to preserve and/or enhance the services where possible.

Agriculture

- **Provisioning services**—Like timberland, our agriculture business depends on provisioning services. We sustainably produce food, feed, and fiber through investments in some 26 crops across our agriculture platform. We manage the risks of our operational environmental and social impacts through sustainable management and by being third-party certified (where certification is available).
- **Regulating services**—We both depend on and have the ability to positively affect regulating services. When land is managed using regenerative agriculture practices, we see improvements in water infiltration rates, reduction of soil erosion, improvements in biodiversity, and improvements in the health of the soil, leading to additional carbon sequestration potential. We recently surveyed our land managers and found that 93% of our client properties, both directly managed

⁸ Ecosystem services are defined and described in the TNFD Guidance. Ecosystem services are the contributions made by ecosystems that benefit economic and other human activity and fall into three categories. See TNFD for more details.

⁹ The average net sequestration per year over the last five years. ¹⁰ This figure represents the sum of lengths of watercourses running through or alongside Manulife Investment Management Timber and Agriculture-managed properties and benefiting from our forest management operational best management practices.

and tenant operated, use three or more regenerative practices.¹¹ We understand the risk to our business, nature, and society if we don't farm sustainably and we're aiming to make a net positive contribution.

- **Cultural services**—We have an opportunity to provide cultural services. Our clients' agricultural land often includes hunting rights, allowing local communities to access land for hunting and recreation.

We also have a sensitive lands program aimed at positively affecting important ecosystem services through protection opportunities. When we identify that the special characteristics of a site are more valuable than its timber provisioning services, we actively seek out opportunities to protect these lands and we work closely with public agencies and environmental groups to enact protection mechanisms. Sensitive lands are typically critical habitat for sensitive or endangered species or lands with high scenic, historical, cultural, and/or recreational value.

As a fiduciary, we understand that preservation of these lands must also provide a competitive return to our clients or otherwise meet their investment goals. Protection may include moving the land into public or conservation group ownership or placing permanent restrictions on how it can be managed, such as through a conservation easement.

Strategy disclosure B and C

Nature-related dependencies, impacts, risks, and opportunities are considered throughout our business, from initial investment due diligence through our operational management of forests and farms. Integration of these considerations from the start of an investment can benefit business resilience because nature is actively factored into our asset valuation and management plans. Additionally, we're embracing technology to explore scenario analysis, which will better inform our ability to make strategic decisions. In 2022, we acquired a climate risk tool to

assist in carrying out quantitative scenario analyses systematically across our global portfolio. This tool is primarily climate focused, but it's useful in the analysis of nature because nature is affected by climate change; in short, the tool allows us to better model how climate-related changes might play out for forests and farms.

Our industry and research partnerships can also positively contribute to resilience. As we've already mentioned, collaboration is a cornerstone of our business. Our connections provide valuable links, efficiencies, and information streams that allow us to stay in touch with stakeholders, peers, and research so that as a business we can keep learning and improving.

Strategy disclosure D

As part of timberland certification processes, we've identified, mapped, and protected areas of high conservation value (FSC) and forest with exceptional conservation value (SFI). In agriculture, the Leading Harvest standard requires conservation of biodiversity and protection of geologically or culturally special sites.

Regardless of certification, we identify and look after these areas as part of our sound management practices. We're actively considering the best way to approach the disclosure of these locations. As mentioned in [section 1](#), our operational scale means significant work is needed to centralize this information for global reporting purposes.

¹¹ See [appendix I](#) for further details.



Risk and impact management

As part of our commitment to helping our clients achieve their objectives and build resilient portfolios, we're committed to maintaining and enhancing nature and biodiversity through our business and investment activities.

We aim to proactively assess and manage nature-related risks and opportunities across our clients' investments, as we understand how essential nature is for the future success of businesses, the economy, and society. We invest in a global economy dependent on nature. We believe companies that better manage natural resources and environmental impacts from operations can offer investors a better risk/reward profile over the long term as nature-related risks begin to manifest both physically and financially.

Risk and impact management disclosure A and B

We identify, assess, and prioritize nature-related dependencies, outcomes, risks, and opportunities in our direct operations by:

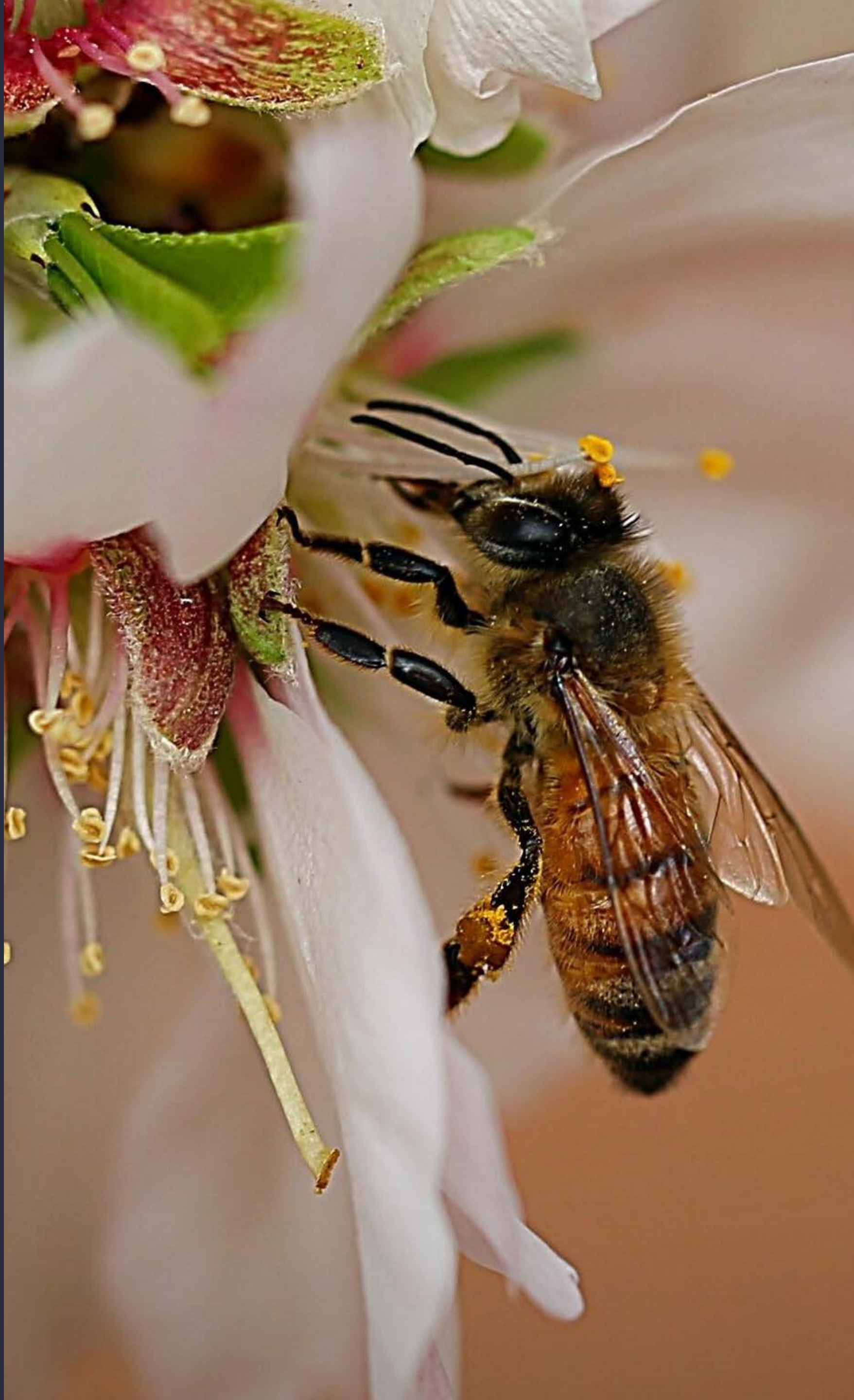
- Evaluating new investment opportunities with our sustainability tool kit
- Applying our deforestation policy, carbon principles, and carbon tool kit
- Committing to sustainable operating principles—verified by third-party certification

We've focused the scope of our initial TNFD disclosure on assets where we have the most influence—those we directly operate—and plan to consider our upstream and downstream value chains in time.

Risk and impact management disclosure C

Our integrated asset management model means that not only are we working in and with nature, we're also continuously observing it, learning from it, and responding to changes that affect us. We strive for continuous improvement in everything we do, and our risk management processes are part of this.

Our processes disclosed in A and B are integrated into and inform the organization's overall risk management processes as described in [section 1](#)—the application of materiality. We refine these processes in review cycles but also proactively if we notice changing trends or issues that need to be addressed.



Metrics and targets

In our reporting, we've taken a quantitative and qualitative approach to nature metrics and targets; this is to give context and examples while metrics evolve and data quality strengthens. [Our sustainable investing reports](#) show the progress we've already made and, as disclosed in previous sections, we're working on developing natural capital accounts for the forests and farms we manage that will provide further insight into our contributions to nature.

For this section of the disclosure, we've taken the same quantitative and qualitative approach in a tiered format:

- 1** We've provided numerical answers wherever possible.
- 2** Where we don't have numbers, but we have qualitative commentary, we've shared it.
- 3** Where the metric is probably material but data isn't yet available, we've noted that.
- 4** Where the metric isn't applicable to our business, we've also noted that.

We've included the categories of TNFD metrics that we consider relevant to our timberland and agriculture business. These are:

- Core global disclosure metrics
- Forestry core sector disclosure indicators and metrics
- Proposed additional forestry sector disclosure indicators and metrics
- Food core sector disclosure indicators and metrics
- Proposed additional food sector disclosure indicators and metrics

Because of the volume of data, we've shared these metrics as tables and included them as [appendix I](#).

Appendix I



Core global disclosure metrics

Metric no.	Core global indicator	Response—agriculture	Response—timberland
	GHG emissions ¹²	<ul style="list-style-type: none">• Scope 1: 33,131 tCO₂e• Scope 2: 18,935 tCO₂e• Scope 3: 193,092 tCO₂e	<ul style="list-style-type: none">• Scope 1: 49,233 tCO₂e• Scope 2: 0 tCO₂e• Scope 3: 482,445 tCO₂e
C1.0	Total spatial footprint	<ul style="list-style-type: none">• Total surface area managed: 622mi² (1,610km²)• Total disturbed area: no data available• Total rehabilitated/restored area: no data available	<ul style="list-style-type: none">• Total surface area managed: 8,441mi² (21,861km²)• Total disturbed area: no data available• Total rehabilitated/restored area: no data available
C1.1	Extent of land/freshwater/ocean-use change	<ul style="list-style-type: none">• Land/freshwater/ocean-use change (farmland, agriculture): Our policy on deforestation prohibits the clearing and conversion of forests with high conservation or cultural value. Read our full policy at manulifeim.com.• Land/freshwater/ocean conserved or restored: no data available• Land/freshwater/ocean sustainably managed:<ul style="list-style-type: none">• sustainably managed land: 444mi² (1,151km²)• sustainably managed waterways: 754mi (1,213km)	<ul style="list-style-type: none">• Land/freshwater/ocean-use change (forest, forest production): Our policy on deforestation prohibits the clearing and conversion of forests with high conservation or cultural value. Read our full policy at manulifeim.com.• Land/freshwater/ocean conserved or restored: 1,787mi² (4,628km²) of conservation area that is voluntary or required by regulation• Land/freshwater/ocean sustainably managed:<ul style="list-style-type: none">• sustainably managed land: 8,441mi² (21,861km²)• sustainably managed waterways: 18,444mi (29,683km)
C2.0	Pollutants released to soil split by type	<p>Crop protectants, fertilizers, and other agricultural chemicals are used responsibly and are useful tools in achieving crop health and productivity as well as environmental and financial objectives. We use integrated pest management (IPM) strategies and controls where possible and strive for minimum effective chemical use.</p> <p>Furthermore, we assess the risk of contamination caused by the off-target movement of agricultural chemicals transported by rain, runoff, or high winds. We conduct evaluations of vulnerable properties and formulate remedial actions such as grassed waterways and barrier hedges.</p>	<p>Herbicides, fertilizers, and other forest chemicals are used responsibly and are useful tools in achieving forest growth, as well as environmental and financial objectives. We strive for minimum effective chemical use. Forest chemicals are used only after evaluating other methods of achieving management objectives, such as IPM. Forest chemicals are applied using the best available technology to ensure the efficacy of the chemical without compromising personal safety or environmental health.</p>
C2.1	Wastewater discharged	Not applicable	Not applicable
C2.2	Waste generation and disposal	Not applicable	Not applicable

12 According to the GHG Protocol, scope 1 emissions are all direct greenhouse gas (GHG) emissions, which are “emissions from sources that are owned or controlled by the reporting entity.” According to the GHG Protocol, scope 2 emissions are “indirect GHG emissions from consumption of purchased electricity, heat or steam.” According to the GHG Protocol, scope 3 emissions are “other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in scope 2, outsourced activities, waste disposal, etc.”

Metric no.	Core global indicator	Response—agriculture	Response—timberland
C2.3	Plastic pollution	Not applicable	Not applicable
C2.4	Non-GHG air pollutants	Not applicable	Not applicable
C3.0	Water withdrawal and consumption from areas of water scarcity	In water-scarce agricultural regions, we conduct extensive environmental and legal due diligence, beyond the scope of standard environmental assessments, to confirm legal access to sufficient water—now and in the future. Furthermore, we take great care to maintain and improve the amount and quality of water flowing through the land we manage and work to increase the number of water sources to mitigate risks from drought. As an example, in California, we’ve built recharge basins that enable floodwaters to be recharged into groundwater aquifers, and in other regions, surface water reservoirs on some properties allow for the capture of rain and reclaimed irrigation runoff to supply water to crops in times of drought or water shortages.	Not applicable. In comparison to other industries, the volume of water directly used in timberland operations is small; however, our operations teams and partners still play their part in ensuring that all water use is conducted in an appropriate and efficient manner. This includes ensuring our operational water footprint is as small as effectively possible to achieve necessary operational duties (e.g., operating nurseries, firefighting, dust abatement, spraying, and in certain situations, equipment washdown).
C3.1	Quantity of high-risk natural commodities sourced from land/ocean/freshwater	Not applicable	Not applicable
C4.0	Placeholder indicator: measures against unintentional introduction of invasive alien species	Long-term crop health and productivity requires the management of undesirable pests, disease, and other damaging agents, using IPM strategies and controls where possible. Additionally, we cooperate with governmental and other organizations to protect crop health and productivity and support university research programs where practical.	Long-term forest health and productivity requires the management of undesirable pests, disease, and other damaging agents, using IPM strategies and controls where possible. Additionally, we cooperate with governmental and other organizations to protect forest health and productivity. We work with research programs, where practical, to incorporate the best available science to develop IPM strategies and controls.
C5.0	Placeholder indicator: ecosystem condition	Healthy ecosystems, whether farmed, fallow, or undeveloped, contain important species and unique natural areas that can serve as measures of ecological health. Where we can, we’re working to protect or enhance these areas. At the same time, we’re actively working to develop a method of measuring biodiversity/ecosystem conditions.	We manage biodiversity at the stand and landscape levels across a gradient of forest and vegetation cover types and successional stages. We’re actively working to develop a method of measuring biodiversity/ecosystem conditions.
	Placeholder indicator: species extinction risk	We’re committed to meeting or exceeding all applicable laws, statutes, and regulations as they apply to threatened and endangered (T&E) species. We manage species extinction risk by promoting conservation on our agricultural properties and implementing farming practices that are compatible with wildlife, including planting native pollinator habitats. We assess for at-risk and T&E species during our investment process, and when they’re present, we apply directed conservation efforts where appropriate.	We’re committed to meeting or exceeding all applicable laws, statutes, and regulations as they apply to T&E species. Biodiversity impact assessment is fundamental to our investment process and sustained through continual due diligence and our integrated property management capabilities. We specifically screen for biodiversity concerns such as T&E species. Our investment phase 1 environmental audit considers risks related to T&E species. On properties where T&E species are present, we restrict management to protect these species.

Proposed forestry sector core disclosure indicators and metrics

Indicator	Response
Forest certification	100% of the timberland properties we manage for our clients are certified under FSC, PEFC, or SFI. ⁴

Proposed additional forestry sector disclosure indicators and metrics

Indicator	Response
Land-use change (% total managed forests certified)	100% of total managed forests are certified under FSC, PEFC, or SFI. ⁴
Land-use change (area of high conservation value)	1,787mi ² (4,628km ²) of conservation area is protected within the timberland portfolio.
Water use	The volume of water directly used in timberland operations is small. See page 23 for more details on our water usage.
Other resource use	8,441mi ² (21,861km ²) of land is managed for the production of timberland products. The land is sustainably managed and certified under FSC, PEFC, or SFI. ⁴
Biological alterations	No data available
Ecosystem services—All	<p>To better measure and understand our nature impacts and dependencies we embarked on a natural capital accounting project, working with a specialist global consultancy in environmental economics.</p> <p>So far, we’ve completed natural capital balance sheets for our U.S. timberland investments. Our assessment considered the following factors: revenue from timberland sales, CO₂e sequestered by woodlands, income from carbon credit sales, CO₂e emitted by operations, PM_{2.5} removed by woodland, revenue from the sale of hunting licenses, and recreation welfare value.</p> <p>We plan to expand this approach across our global timberland and agriculture portfolio in 2024.</p>

Proposed food sector core disclosure indicators and metrics

Indicator	Response
Deforestation-free products	100% of the agriculture and timberland assets we manage for clients adhere to our policy on deforestation, which prohibits the clearing and conversion of forests with high conservation or cultural value, and commits to following appropriate deforestation cutoff dates defined by the most relevant biome or geography-specific deforestation protocols in areas where we invest. Read our full policy .
Regenerative or sustainable land management	93% of our clients’ farms use three or more regenerative soil health practices. ¹³ Percentage of agriculture properties that deployed each of the following regenerative practices: <ul style="list-style-type: none">• Crop residues: 92%• Conservation tillage: 89%• Soil amendment: 67%• Cover crop: 65%• Crop rotation: 46%• Nonproductive vegetation: 43%• Rotational grazing: 4%• Intercropping: 2%
Waste management	No data available
Products from areas of water stress	<p>The following data presents a water risk assessment of Manulife agriculture managed assets as scored by The WRI’s Aqueduct Water Risk Atlas tool. This tool provides geographic assessments of water risk under the topics of physical water quantity and quality, and regulatory and reputational risk. The data presented is weighted by asset count with a geographical resolution of local county or equivalent jurisdiction. The risk rating is helpful to identify potential risk, but does not account for granular asset level water supply characteristics (such as whether the asset is part of a water district or has access to multiple water sources) or water management plans that are employed by Manulife Agriculture that may in part or whole mitigate the water risks identified by the WRI Aqueduct tool. The percentage of agriculture properties’ baseline water stress are¹⁴:</p> <ul style="list-style-type: none">• Extremely high: 22%• High: 17%• Medium-high: 11%• Low-medium: 19%• Low: 30%• Arid and low-use land: 2%¹⁵

13 The statistics shown represent 90% of properties within the 2022 agriculture portfolio. Statistics do not include properties belonging to any of the following categories: properties under management for less than the full 2022 calendar year; properties not in operation during the 2022 calendar year; properties managed by third parties other than tenants (e.g., management companies); and farmland plus assets. **14** The WRI’s Aqueduct Water Risk Atlas tool was used to assess the agriculture portfolio. Properties were scored based on the counties or regions they were in. **15** Note figures may not sum to 100% due to rounding.

Proposed additional food sector disclosure indicators and metrics

Indicator	Response
Land-use change (>10%, >20% natural vegetation)	22% of eligible cropland manages ≥ 10% natural vegetation per acre ¹⁶ 8% of eligible cropland manages ≥ 20% natural vegetation per acre
Land-use change (actual and potential yield by crop)	No data available
Land-use change (crop breed diversity)	No data available
GHG emissions from refrigerants	0 tCO ₂ e ¹⁷
Water pollution (water discharged per tonne of crop)	No data available
Water pollution (wastewater discharged)	No data available
Water pollution (loading rate)	No data available
Waste (% food loss)	No data available
Waste (nutritional density of food waste)	No data available
Waste (weight of nonplastic packaging)	No data available
Waste (% nonplastic packaging from sustainable materials, % that is recycled, reused, or composted)	No data available
Soil pollution (avoided pesticide per hectare)	No data available
Soil pollution (nitrogen use efficiency)	No data available
Biological alterations	Not applicable
Ecosystem condition (soil degradation)	No data available
Ecosystem condition (litter in water column)	No data available
Ecosystem condition (eutrophication)	No data available
Ecosystem condition (pesticides by location)	No data available

16 Property acres of nonproductive vegetation (grassed waterways and native corners, for example) relative to total acres of the property. If properties had >10% or >20%, they were included in the statistic. **17** Agriculture infrastructure investments that use refrigerants all use closed-looped systems.

Indicator	Response
Ecosystem condition (volume of discharge flow and mass of nutrients)	No data available
Ecosystem condition (change in soil organic carbon stocks over 5+ years)	Of a 32-property sample of properties (13% of the overall portfolio), there has been an increase in soil organic carbon (SOC) of 157,215 tCO ₂ e in comparison to the lowest measured value between 2017 and the most recent measure of 2023. The sample of properties currently has a total of 2,039,403 tCO ₂ e of SOC, with a potential maximum capacity of 3,570,728 tCO ₂ e (57% of the potential).
Extinction risk (Species Threat Abatement Restoration)	No data available
Extinction risk (Red List Index)	No data available
Population size (local species population index)	No data available
Population size (diversity of pollinators and natural predators)	No data available



Manulife
Investment Management

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