Science Based Targets for Land

Version 1

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INTERNAL CONSULTATION DISCLAIMER

Please keep the following disclaimers in mind as you review this content.

1. This consultation is NOT open to the public and applies to the following document: "Science Based Targets for Land" and its annexes.
2. The scope of the guidance documents in this restricted consultation are confined to SBTN Step 3 (Measure, Set, and Disclose) of the five-step SBTN Framework. Steps 4 (Act) and 5 (Track) will be addressed in later versions of SBTN's guidance.
3. This document is the first of several iterative internal feedback reviews with SBTN's NGO and corporate partners and invited experts. It will be copyedited and fully referenced before public consultation, including alignment and consistency of terminology.
4. Companies are not able to start setting targets using SBTN's guidance until Q1 2023, at which point SBTN will release science-based targets for nature v1. SBTN will not recognize claims, public statements, or any targets coming from the use of this guidance before public approval in Q1 2023.
5. The guidance document is written in technical language; the primary audience of this document should have the technical knowledge necessary to engage with this content. A more corporate-friendly version of this guidance will be published as part of the SBTs for nature v1 release in 2023.
6. Due to the technical nature of this content, feedback is requested from stakeholders with the following expertise: sustainability, environmental risk management, environmental and social science, ecology and conservation.
7. For further information about this preliminary consultation, please email your SBTN point of contact.

About this guidance

The Science Based Targets Network (SBTN) was established to develop methods for cities and companies to set integrated targets across all Earth systems - air, water, land, biodiversity, and ocean—building on the progress of the Science Based Targets initiative (SBTi) which enables companies to set science-based climate mitigation targets.

This guidance document represents the first contribution of the individuals and representative organizations focused on **land systems** within SBTN (hereafter referred to as "SBTN Land").[1] The document forms part of SBTN's "Science Based Targets for Nature version 1" – the first set of comprehensive nature targets that will raise the bar on corporate ambition on nature in line with the scientific evidence on what nature needs and will allow companies to prepare for adoption of more comprehensive and integrated targets to be published by the SBTN in due course.

This document covers:

- Why the world needs Land targets
- Target approach and alignment with existing initiatives
- The process for setting Land targets
- Guidance on each Land target
- Context and rationale for Land targets

[1] SBTN Land is led by World Wildlife Fund (WWF-US) and Conservation International (CI) and includes representatives from The Nature Conservancy (TNC), World Resources Institute (WRI), the Food and Land Use Coalition (FOLU), and SYSTEMIQ.

I. Introduction

The world is in the midst of a climate and nature emergency. Global mean temperatures are on track for an increase of more than 2.5°C – far above the defined "safer upper limit" of 1.5°C.[2,3] And at the same time, our society is witnessing what scientists describe as "the sixth mass extinction since the beginning of life on Earth"[4] with around half of the Earth's nature having been destroyed since the industrial revolution and most in less than half a century, along with the elimination of 2/3 of global animal populations, including mammals, birds, fish, amphibians and reptiles.[5]

The nature and climate crises are deeply intertwined in terms of:

- **Common drivers**: Human use now directly affects more than 70% of the global, ice-free land surface[6] and land use change and direct exploitation of land are the main drivers of human-induced loss of nature in all global regions and are precursors to each of the remaining drivers, including climate change, invasive alien species and pollution.[7]
- **Interactions (both positive and negative):** Biodiverse soils sequester more carbon and healthy ecosystems support climate adaptation. At the same time, climate change itself is a primary driver of biodiversity loss with rising temperatures and sea levels resulting in species redistributions and extinctions.
- **Solutions:** Protecting and restoring nature, especially in working lands, can deliver multiple wins for climate mitigation, adaptation, biodiversity and people. There is also congruence in important areas for biodiversity and nature's contributions to people and for climate mitigation (both in avoiding emissions and sequestering and storing of carbon).

How and where land is used sits at the heart of this discussion. The importance of land and its use is supported by its inclusion as a key topic in nearly every major international global assessment or report, including those on biodiversity, desertification, climate, freshwater, and oceans.

i. Introducing Land targets

The aim of SBTN is to develop a methodology for science-based targets (SBTs) that will enable the corporate sector to align their own commitments to nature with the necessary speed and scale of action as determined by science. The outputs from this v1 methodology are hereafter referred to as SBTs for land, Land SBTs, or more simply, "Land targets".

Land SBTs will rely on the familiarity of companies with climate targets and existing corporate accountability commitments for deforestation and conversion of land. These existing commitments are the result of decades of work to understand climate change and

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[2] https://www.unep.org/emissions-gap-report-2020

[3] https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf

[4] Ceballos, G., Ehrlich, P. and Dirzo, R. 2017. 'Population losses and the sixth mass extinction' *Proceedings of the National Academy of Sciences* Jul 2017, 114 (30) E6089-E6096; DOI:10.1073/pnas.1704949114))

[5] https://www.wwf.fr/sites/default/files/doc-2020-09/20200910_Rapport_Living-Planet-Report-2020_ENGLISH_WWF-min.pdf

[6] IPCC, 2019: Summary for Policymakers. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. https://doi.org/10.1017/9781009157988.001

[7] Jaureguiberry, P., Titeux, N., Wiemers, M., Bowler, D. E., Coscieme, L., Golden, A. S., ... & Purvis, A. (2022). The direct drivers of recent global anthropogenic biodiversity loss. Science Advances, 8(45), eabm9982.

deforestation, its sources, and who bears responsibility. This work has led to significant innovation both in science and in the capacity of the private sector to respond to its responsibility for past and ongoing emissions and impacts.

Land SBTs are necessary to address what climate targets cannot and to ensure that corporate targets for nature have a positive impact on land and consequently on the Earth system. The land targets described in this document integrate and complement corporate climate targets by incentivizing activities related to wider, non-GHG impacts on land, for example the reduction and treatment of pollution and effluents, reduced pesticide use, erosion control and other actions which promote biodiversity and ecosystem integrity.

Adoption by companies of the Land SBTs presented in this document is a leap forward in voluntary corporate accountability. They will address impacts on land and nature and will expand focus beyond forests to include other natural ecosystems, especially as they relate to the working lands (e.g., cropland rangeland, pasture, managed forest) that facilitate the production of goods used by companies.

Moreover, while firmly rooted in directing companies to assess, avoid, or mitigate their impacts on nature, Land SBTs will go further by incentivizing companies to deliver on regenerative, restorative, and transformative actions in land systems— including those that underpin broader issues of sustainable development and that are in line with a nature positive future.

This first version of SBTs for Land is based on the information and data that is currently available and will provide an outline of the Land targets that companies can set now. This will allow companies to assess their impacts on several key components of land (using the SBTN guidance for Step 1: Assess and Step 2: Interpret & Prioritize) and to set targets that will allow for quantifiable contributions at the company and landscape level (using the guidance in this document for Step 3: Measure, Set & Disclose).

These methods for target setting (v1) will be further refined during 2023 and 2024 as land system science and methods for accounting for impacts and dependencies on nature progress. Specifically, SBTN Land is working over this period to quantify spatially explicit thresholds that define what nature needs to thrive and quantify the ecological limits of human modification and use of terrestrial land systems that will form the basis of the second version of Land SBT methods.

Version 1 of the Land SBTs comprise three distinct targets (as shown in Table 1), which companies should adopt depending on the materiality of pressures generated by the company's activities, as well as the sector and size of the company (for more information see section iii below on "Requirements for setting SBTs for land").

Table 1 - Science-based Targets (SBTs) for Land

Science Based Targets for Land*	
Target 1	**No Conversion of Natural Ecosystems**
Target 2	**Reduction in Land Occupation**
Target 3	**Increase in Ecosystem Integrity**

*SBTN Land has complemented the three Land Targets with a requirement for Forest, Land and Agriculture (FLAG) companies to set a sister target on land GHG emissions following the SBTi FLAG methodology requirements (note: for companies required to set climate targets as per FLAG's guidance).

The three SBTN Land targets in Table 1 have been developed according to their capacity to address the criteria outlined in Table 2 below.

Table 2 – SBTN Land Target Criteria

SBTN Land Target Criteria	
1	Maximum coverage of pressures most relevant to the impacts most companies have on land.
2	Underpinned by quantifiable and measurable metrics which can be feasibly impacted by company activities to make progress against the target.
3	Align with and build on active and relevant corporate sustainability standards and initiatives.
4	Incentivize action across SBTN's AR3T mitigation hierarchy: **A**voidance and **R**eduction of impacts as well as **R**egeneration and **R**estoration of nature, all underpinned by systems **T**ransformation.

ii. Alignment of Land Targets with existing corporate commitments

SBTN Land Targets are designed to increase the clarity, ambition, and/or scope of existing initiatives that, despite intent, have not led to the transformational changes required to address climate change and nature loss. Land SBTs link to and build upon existing and emerging initiatives and frameworks and are not intended to lead to parallel or asynchronous processes that confuse or undermine existing, quality work on corporate sustainability.

In this version, Land SBTs will further quantify the specific contributions that companies can make to reduce their impacts on land and to contribute to a nature positive future by 2030.

To achieve this, SBTN Land targets reflect an integrated approach to target setting, accounting, and reporting.

The first version of Land SBTs is built upon and written in collaboration with the experts and institutions that developed key existing data and environmental initiatives that cover land-related impacts, namely:

- The Greenhouse Gas Protocol (GHGP) Land Sector and Removals Guidance
- Science Based Targets initiative's Forest, Land and Agriculture (FLAG) Guidance
- The Accountability Framework Initiative (AFi)

The development of Land SBTs in connection with the above listed initiatives helps ensure alignment, strengthens the target approaches, and reduces the burden for companies, who are already working or will work with these initiatives.

Many companies will already be familiar with these initiatives and will have collected requisite data and information that they can use to set SBTN Land Targets. There will, however, be some data and conditions that are more specific to SBTN Land.

Box 1 - Alignment of SBTN Land Targets with existing initiatives

The following initiatives, developed as guidance and standards for companies, are designed to be used in parallel with SBTN Land Targets:

The Science Based Targets initiative (SBTi) has developed a methodology for Forest, Land and Agriculture (FLAG) companies to set 1.5°C aligned climate targets for land-based emissions and removals.

The Accountability Framework initiative (AFi) supports the process of defining targets, accounting, and disclosure related to deforestation and ecosystem conversion in commodity supply chains. The Accountability Framework provides a reference for best practice on no-deforestation and no-conversion policies that is used by SBTi and the GHG Protocol, and SBTN. . Valid SBTi FLAG targets require companies to set no-deforestation commitments in alignment with the Accountability Framework. by specifying details for commitments to eliminate land use change, which the SBTi FLAG methodology requires.

The Draft GHG Protocol Land Sector and Removals Guidance instructs users on how to carry out emissions inventories needed to set valid SBTi FLAG targets and to monitor progress toward meeting them

These three initiatives have also worked in collaboration to align on definitions, targets, and many aspects of accounting at different scales of analysis and for different types of land use change.

iii. Requirements of companies for setting Land targets

Setting Land SBTs is part of Step 3 of the five-step process for setting SBTs for nature. Before using the land methods, companies *must* first complete Step 1 (Assess) and Step 2 (Interpret & Prioritize).[8] These earlier steps of the SBTN target setting process will enable companies to determine which pressures they most likely need to address with targets, and which parts of their business are the highest priority to get started with first.

There is a dedicated section of this guidance for each of the three targets outlining which companies need to set which of the targets. For Target 1: No Conversion of Natural Ecosystems, please see Section X; for Target 2: Reduction in Land Occupation, please see Section Y; for Target 3: Increase in Ecosystem Integrity, please see Section Z. At a high level, companies should adopt each of the three land SBTs depending on:

~~1.~~ The materiality of specific pressures generated because of the company's activities, such as terrestrial ecosystem use/change, also known as land conversion. Materiality of these pressures should be determined by companies before applying the Step 3 methods, by using the Step 1 guidance from SBTN. If land-associated pressures (see Table 3 below) are identified as material during these assessment steps, a company will be required to set at least one land target.
2. The International Standard Industrial Classification of All Economic Activities (ISIC) designated sector(s) of the company. See Table 4 below.
3. The size of the company.
4. The impact of the company in terms of emissions and/or the land occupation footprint.

Depending on the above criteria, the targets will be:

a. Required,
b. Recommended
c. Not required, or
d. Not applicable.

In order to have their SBTs validated, companies will need to meet the requirements put forward in this method.

Table 3 - Pressure categories covered by SBTs for nature, from SBTN Step 1. Pressures in bold are those covered in the SBTs for land methods. Companies that have material contributions to these, as identified in Step 1, will be required to set Land targets.

IPBES Pressure Category	SBTN Pressure Category
Ecosystem Use and use	**Terrestrial ecosystem use and use change**
	Freshwater ecosystem use and use change
	Marine ecosystem use and use change
Resource exploitation	Water use
	Other resource use (minerals, fish, other animals, etc.)
Climate Change	**GHG emissions**
Pollution	Non-GHG air pollutants
	Water pollutants
	Soil pollutants

[8] SBTN Step 1 & 2 Guidance

Box 2- What are the overlaps and differences between SBTi FLAG methods and SBTN Land methods?

The SBTi Forest, Land and Agriculture (SBTi FLAG) target setting methodology is based on land-related greenhouse gas emissions and removals. The focus is therefore on climate change and the actions companies take to address these emissions will maximize emissions reductions and removals. It also includes a requirement for companies to set a no-deforestation target and a recommendation for companies to set a no-conversion target.

The suite of SBTN land targets have a wider focus on what **nature** needs, for example, the ecosystem integrity SBTN land target is built upon multiple indicators of impact on land (e.g., removal of net primary productivity, pollution) and the no conversion of natural ecosystems target more explicitly addresses non-forest natural ecosystems.

While there is a significant overlap in terms of the actions on land that companies would take to deliver against their SBTs for land-related GHGs and removals (i.e. climate) and nature, the integration of climate and nature at the goal-setting level incentivizes more holistic approaches over singular "silver bullet" approaches that maximize the outcome of one indicator. For example, a climate-only lens might lead to fast-growing, monoculture, non-native tree planting for rapid carbon sequestration where land is relatively cheap (i.e. the biodiversity-rich tropical belt). This may have disastrous impacts on water availability, biodiversity loss and resilience in a region which would likely undermine climate outcomes due to increased wildfires, pests and disease.

Table 4 below outlines the applicability of each of the Land SBTs based on sector classification as a quick guide to understand which land targets a company is required to set, which are recommended, and sectors for which targets are not applicable.

Table 4 – Sector requirements for Land SBTs

Sector (ISIC)	No Conversion	Land Occupation Reduction	Ecosystem Integrity
Crop and animal production, hunting and related service activities	Required	Required	Required
Manufacture of food products	Required	Required	Required
Manufacture of beverages	Required	Required	Required
Manufacture of tobacco products	Required	Required	Required
Manufacture of textiles	Required	Required	Required
Manufacture of wearing apparel	Required	Required	Required
Manufacture of leather and related products	Required	Required	Required
Wholesale trade...	Required	Required	Required
Biofuel*	Required	Required	Required
Retail trade...	Required	Required	Required
Fishing and aquaculture	Required	Required	Not applicable
Real estate activities	Required	Not required	Required
Forestry and logging	Required	Not required	Required
Sports activities and amusement and recreation activities	Required	Not required	Required
Manufacture of wood and of products of wood ...	Required	Not applicable	Required
manufacture of paper products	Required	Not applicable	Required
Other Consumer Goods manufacturer*	Required	Not applicable	Required
Accommodation	Required by FLAG	Not required	Required
Support activities for crop production	Required by FLAG	Not applicable	Required
Manufacture of chemicals and chemical products	Required by FLAG	Not applicable	Required
Manufacture of basic pharmaceutical products ...	Required by FLAG	Not applicable	Required
Manufacture of furniture	Required by FLAG	Not applicable	Required
Manufacture of machinery and equipment...	Required by FLAG	Not applicable	Recommended
Manufacture of computer, electronic and optical products	Recommended. Required IFC PS 6	Not applicable	Required
Mining of coal and lignite	Recommended. Required IFC PS 6	Not required	Required
Extraction of crude petroleum and natural gas	Recommended. Required IFC PS 6	Not required	Required
Mining of metal ores	Recommended. Required IFC PS 6	Not required	Required
Other mining and quarrying	Recommended. Required IFC PS 6	Not required	Required
Electricity, gas, steam and air conditioning supply	Recommended. Required IFC PS 6	Not required	Required
Construction of buildings	Recommended. Required IFC PS 6	Not required	Required
Civil engineering	Recommended. Required IFC PS 6	Not required	Required
All other sectors*	Not required	Not required	Recommended

*not an ISIC sector classification

a. Mandatory alignment of a No Conversion Target with climate target

Given that climate and nature goals can and must be achieved holistically, the Land Hub *requires* companies which are required to set SBTi FLAG climate targets to complement their SBTN Land targets with a target on land-based GHG emissions and removals following the SBTi FLAG methodology requirements (see SBTi FLAG)

Correspondingly, companies required by SBTi to set FLAG climate targets, are *required* by SBTN to set a No Conversion of Natural Ecosystems target.

SBTi requires the companies falling into either of the below categories to set FLAG climate targets:

i. **Companies from the following SBTi-designated sectors**:
   a. **Forest and paper products** (forestry, timber, pulp and paper); food production (agricultural production);
   b. **Food production** (animal source);
   c. **Food and beverage processing**;
   d. **Food and staples retailing**; and
   e. **Tobacco**.

Companies in **any other sector** with **FLAG-related emissions** that total **more than 20% of overall emissions across scopes**. The 20% threshold should be accounted for as gross emissions, not net (gross minus removals).

When No Conversion is Recommended but not required

For companies whose operations cannot always avoid land conversion, a no conversion target is *recommended* in addition to the *requirement* that such companies adhere to the mitigation hierarchy and satisfy their requirements under the International Financial Corporation's (IFC) Performance Standard 6 which helps companies plan for and address their impacts on biodiversity at a project level.

Several sectors have dramatic impacts on conversion of natural ecosystems but would cease to exist were they to entirely comply with a no conversion of natural ecosystems target. That a no conversion target is **recommended** and not **required** is an acknowledgement from SBTN of this reality. However, this is not an endorsement of conversion of natural ecosystems from these sectors. Instead, SBTN recognizes the conversion restrictions placed on these sectors through the International Finance Corporation Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources. These sectors frequently operate using Performance Standard 6 and a demonstrated compliance with it may[designated geographies or PS6 designed critical habitat will not be considered compliant under an SBTN No Conversion target.

iv. Data that companies will ultimately use to set land targets

The headline data requirements are outlined below and more detailed guidance on how this data should be collected and used is provided in the more detailed sections for each of the three targets:

1. **No Conversion of Natural Ecosystems**
   a. Hectares of natural ecosystems converted on land owned, controlled or managed by the company's direct operations after the baseline year 2020.
   b. Hectares of natural ecosystems converted on production units or in sourcing areas known to be in the company's supply chain after the baseline year 2020.
2. **Reduction in Land Occupation**
   a. Hectares of working land under direct operational or sourcing footprint.
   b. Hectares of working land needed to produce a commodity unit.
3. **Ecosystem Integrity Index values**
   a. Location and area of holdings pertaining to high impact commodities and locations prioritised in Step 2 (see Annex 1 and Annex 3)
   b. Land use and intensity data for each location (preferred) or origin and volumes at the production unit level or sourcing area level.

Note for reviewers: **While v1 SBTs for land use hectares as a metric, a hectare target cannot capture the full scope and intent of SBTs for land. This is because while land area is an important measurement, the condition of land and its quality for nature and people is equally relevant**

Table 5.a - v1 SBT for land data requirements

Data Required from company	Target 1: No conversion of natural ecosystems	Target 2: Reduction of land occupation	Target 3: Ecosystem integrity
Producers and site owners/operators	■	■	■
Direct sourcing (first buyer or first point of aggregation)	■ or ∞	■ or ∞	■ or ∞
Indirect sourcing (key commodities)	■ or ∞	∞	∞
Indirect sourcing (all other embedded volumes)	∞	∞	∞

■ = spatial data: minimum subnational jurisdiction scale, ideally at production unit scale.
∞ = non-spatial data: outlined in target-specific sections

Table 5.b – v1 SBT for land data requirements

Data Required from company	Target 1: No conversion of natural ecosystems	Unit of measurement	Target 2: Reduction of land occupation	Unit of measurement	Target 3: Ecosystem integrity	Unit of measurement
Producers and site owners/operators	Locations of all sites where high impact commodities are produced. Locations of all mining and project sites. Area converted after cut-off date	Production Unit [Hectares] Mining sites [Hectares] Project sites [Hectares]	Locations of all sites where high impact commodities are produced.	Production Unit [Hectares]	Locations of all sites (to ecosystem level) prioritised in step 2. Land use and intensity data for each location (preferred) or origin and volumes at the production unit level or sourcing area level	Production Unit [Hectares] Mining sites [Hectares] Project sites [Hectares] Land use and land use intensity
Direct sourcing (first buyer or first point of aggregation)	Production Unit or Sourcing Area of high impact commodities purchased Area converted after cut-off date Volumes of high-risk land-intensive commodities purchased from each production unit or sourcing area.	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]	Production Unit or Sourcing Area of high impact commodities purchased Volumes of high-risk land-intensive commodities purchased from each production unit or sourcing area.	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]	Production Unit or Sourcing Area of high impact commodities purchased Volumes of high-risk land-intensive commodities purchased from each production unit or sourcing area.	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]

Data Required from company	**Target 1: No conversion of natural ecosystems**	**Unit of measurement**	**Target 2: Reduction of land occupation**	**Unit of measurement**	**Target 3: Ecosystem integrity**	**Unit of measurement**
Indirect sourcing (embedded)	Preferred: Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]	Preferred Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]	Preferred Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased	Production Unit or Sourcing Area [Hectares] [metric tonnes or equivalent]
Indirect sourcing (non-embedded)	Volumes of high-risk land-intensive commodities embedded into complex products purchased		Required Volumes of high-risk land-intensive commodities embedded into complex products purchased		**Required** Volumes of high-risk land-intensive commodities embedded into complex products purchased	

SBTN Step 1: Assess and Step 2: Interpret & Prioritize

In SBTN guidance for Step 1: Assess, companies gather information on the material pressures generated by their activities and on the corresponding state of nature in the locations where they operate.

In this process, companies first screen their portfolio of economic activities for materiality of different pressures, and then estimate their contributions toward these through an assessment of pressures and impacts associated with each category of activity. Based on the materiality of land-associated pressures, companies may be required to set SBTs for land.

In the next phase of target setting, Step 2: Interpret & Prioritize, companies use the information collected in Step 1 to determine the most important places to set targets on first in order to effectively mitigate their most significant negative impacts on nature and increase their potential for positive impacts. The activities that are within scope for a given pressure target (e.g. for land use change/No Conversion) are said to fall within the **target boundary** for that pressure.

Note that for companies setting targets on no conversion of natural ecosystems and on land occupation reduction, ALL locations and activities within the target boundary must be included to avoid leakage between locations. This means companies cannot use a prioritization approach to choose different locations to get started with first in Step 2 for their land use change and land use target boundaries; all locations must be included within scope in the first year that targets are set. Companies setting land targets may still be able to have different prioritization of locations for targets on other pressures (e.g. water use) applied during Step 2.

No Conversion of Natural Ecosystems

To set SBTs for land, companies in sectors with material land pressures (see Figure 1) are *required* to commit to no conversion of natural ecosystems. The target dates for achieving conversion-free operations and supply chains are differentiated according to the level at which a company operates along supply chains, the type of commodities sourced, and the origins of those commodities. The targets are also differentiated in terms of coverage of sourcing volumes included in the targets.

This chapter of the SBTN Land Guidance sets out:

1. Key definitions relevant for this target
2. Information on **why** the target is needed
3. Information on **who** needs to set the target
4. Information on **what** the target looks like for different companies depending on direct operations and upstream sourcing of commodities
5. Information on **how** to set, report and communicate the target
6. A technical annex articulating the scientific basis of the target

1.1 Key definitions relevant for this target

Natural ecosystem: An ecosystem that substantially resembles – in terms of species composition, structure, and ecological function – one that is or would be found in a given area in the absence of major human impacts. This includes human-managed ecosystems where much of the natural species composition, structure, and ecological function is present. Natural ecosystems include:

- Largely "pristine" natural ecosystems that have not been subject to major human impacts in recent history;
- Regenerated natural ecosystems that were subject to major impacts in the past (for instance by agriculture, livestock raising, tree plantations, or intensive logging) but where the main causes of impact have ceased or greatly diminished and the ecosystem has attained species composition, structure and ecological function similar to prior or other contemporary natural ecosystems;
- Managed natural ecosystems (including many ecosystems that could be referred to as "semi-natural") where much of the ecosystem's composition, structure, and ecological function are present; this includes managed natural forests as well as native grasslands or rangelands that are, or have historically been, grazed by livestock;
- Natural ecosystems that have been partially degraded by anthropogenic or natural causes (e.g., harvesting, fire, climate change, invasive species, or others) but where the land has not been converted to another use and where much of the ecosystem's composition, structure, and ecological function remain present or are expected to regenerate naturally or by management for ecological restoration.[9]

Conversion: A change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.[10]

1.2 Why is the target needed?

[9] https://accountability-framework.org/wp-content/uploads/2022/09/AFI-LUC-and-Emissions-Guidance-09_2022.pdf
[10] https://accountability-framework.org/wp-content/uploads/2022/09/AFI-LUC-and-Emissions-Guidance-09_2022.pdf

The contributions of natural ecosystems are critical to planetary and human health. They store vast quantities of carbon, and provide protection, livelihoods, materials, food, fresh water, and a sense of cultural identity to billions of people, including Indigenous peoples and local communities.[11,12] Forests alone provide habitats for about 80% of amphibian species, 75% of bird species and 68% of mammal species.[13]

Yet humans have converted between 1/3 and 1/2 of habitable land for crop and livestock production, undermining these critical ecosystem services upon which we rely.[14] Deforestation and land degradation cost as much as USD 6.3 trillion a year through their impact on forest and agricultural productivity.[15] In sub-Saharan Africa, over two-thirds of productive land is degraded, compromising its capacity to support people and nature and undermining the livelihoods of at least 450 million people.[16]

The conversion and degradation of forest land has been given significant attention via dedicated initiatives and private sector commitments to end deforestation. Over one-third of forests have been lost globally due to deforestation since it first became a pervasive threat in temperate zones between the 18th and 20th century, and drastically increased in the tropics over the past 50 years (Hansen et al. 2013; Haddad et al. 2015). Since 2010, the worldwide net loss of forests was estimated to be 4.7 Mha per year.[17] The rates of tropical deforestation are now particularly dire and are estimated to account for more than 97% of deforestation worldwide in the past century and more than 90% of global deforestation between 2000 and 2018.[18,19] 90% of recent deforestation across the tropics has been driven by agriculture, the majority of which is caused by seven commodities: cattle, palm oil, soy, cocoa, rubber, coffee and plantation wood fibre, with cattle having by far the largest impact.[20]

Despite their critical importance, less attention has been given to the loss of other, non-forest natural ecosystems. Non-forest ecosystems are suffering conversion rates as high or higher than those of forests.[21] For example, natural grasslands – which hold high levels of biological diversity, are crucial for the mitigation of climate change and provide significant value to people – are among the most threatened ecosystems in the world.[22] Efforts towards

[11] Beatty, C.R., Stevenson, M., Pacheco, P., Terrana, A., Folse, M., and Cody, A. 2022. The Vitality of Forests: Illustrating the Evidence Connecting Forests and Human Health. World Wildlife Fund, Washington, DC, United States

[12] Chaplin-Kramer et al.: Chaplin-Kramer, Rebecca, Rachel A. Neugarten, Richard P. Sharp, Pamela M. Collins, Stephen Polasky, David Hole, Richard Schuster, et al. "Mapping the Planet's Critical Natural Assets." Nature Ecology & Evolution, November 28, 2022, 1–11. https://doi.org/10.1038/s41559-022-01934-5.

[13] https://www.fao.org/3/cb9360en/cb9360en.pdf

[14] https://www.fao.org/food-agriculture-statistics/en/

[15] Sutton, P.C., S. Anderson, R. Costanza, and I. Kubiszewski. 2016. "The Ecological Economics of Land Degradation: Impacts on Ecosystem Service Values." Ecological Economics 129: 182–192.

[16] UNEP. 2015. *The Economics of Land Degradation in Africa*. Bonn: ELD Initiative. Available online at: https://www.nmbu.no/sites/default/files/pdfattachments/eld-unep-report_05_web_b-72dpi_1.pdf

[17] https://www.fao.org/3/ca8642en/ca8642en.pdf

[18] WRI 2022

[19] https://www.fao.org/3/cb9360en/cb9360en.pdf

[20] Pendrill, F., Gardner, T. A., Meyfroidt, P., Persson, U. M., Adams, J., Azevedo, T., ... & West, C. (2022). Disentangling the numbers behind agriculture-driven tropical deforestation. Science, 377(6611), eabm9267.

[21] Sayre et al., 2020

[22] Lark, T. J. (2020). Protecting our prairies: Research and policy actions for conserving America's grasslands. Land Use Policy, 97, 104727.

avoiding the conversion of forests should be broadened to incorporate the conservation of non-forest natural ecosystems[23] and this guidance walks that path.

Table 6 - Amount of conversion of the world ecosystems, grouped by their vegetation/ land cover attribute (Sayre et al., 2020)

Vegetation/Land Cover	Current (actual) Area (thousand ha)	Converted (potential) Area (thousand ha)	Conversion (%)
Forestlands	4,377,500	1,501,203	25.5
Shrublands	1,632,918	202,040	11
Grasslands	1,267,528	891,752	41.3
Sparsely or Non-vegetated	2,967,203	58,316	1.9
Snow and Ice	228,479	10	0.005

For additional information on the importance of natural ecosystems and for the scientific evidence supporting the choice of the no conversion target, please refer to the Annex 4.

[23] Gonçalves-Souza, D., Verburg, P.H. & Dobrovolski, R. (2020). Habitat loss, extinction predictability and conservation efforts in the terrestrial ecoregions. Biological Conservation, 246, 108579.

1.3 Who is required to set a no land conversion target?

Companies will *need* to set a no conversion of natural ecosystem target if:

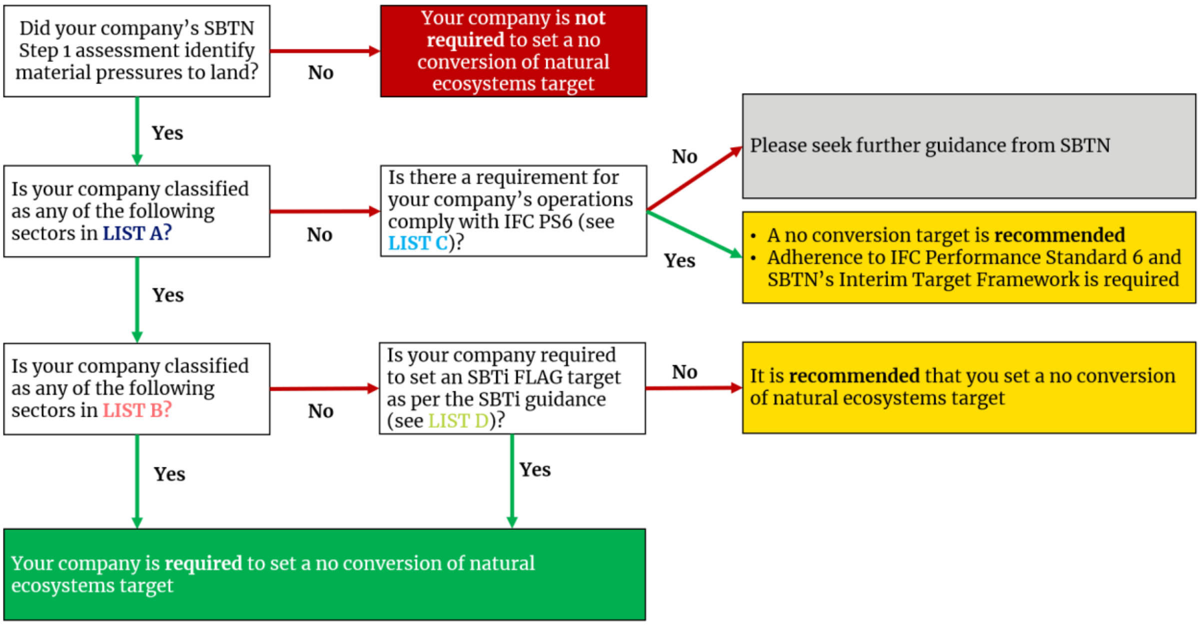
a) It is identified during SBTN's Step 1 (Assess) that land-associated pressures (table 3) are material

AND

b) Table 4 of this document indicates that a no conversion target is *required* for the International Standard Industrial Classification of All Economic Activities (ISIC) designated sector(s) of the company. The second column of Table 4 will say either "Required" or "Required by FLAG".

For companies where pressures to land have been identified as material in the SBTN Step 1 (Assess), but where their sector designation does not **require** them to set targets, SBTN ***recommends*** adherence to SBTN's Interim Target Framework requirements and the International Financial Corporation's (IFC) Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (PS6). This is in recognition that there are certain sectors which have dramatic impacts on conversion of natural ecosystems but lack the adaptability as sectors to entirely comply with a no conversion of natural ecosystems target. That a no conversion target is *recommended* and not required is an acknowledgement from SBTN of this reality. However, this is not an endorsement of conversion of natural ecosystems from these sectors. Instead, SBTN recognizes the conversion restrictions placed on these sectors through the IFC PS6. These sectors frequently operate using this Performance Standard and in the absence of a viable no conversion target from a company representing this sector, demonstrated compliance with PS6 – whether required by their production activities or not, may satisfy partial progress on a no conversion target. Biodiversity offsets of Group 1 designated geographies or PS6 designed critical habitat *will not be considered compliant* under an SBTN No Conversion target.

Built upon the sector requirements of Table 4, the decision-tree below guides companies in understanding their target setting requirements as it relates to no conversion of natural ecosystems.



List A

Crop and animal production, hunting and related service activities
Manufacture of food products
Manufacture of beverages
Manufacture of tobacco products
Manufacture of textiles
Manufacture of wearing apparel
Manufacture of leather and related products
Wholesale trade...
Biofuel
Real estate activities
Forestry and logging
Fishing and aquaculture
Sports activities and amusement and recreation activities
Manufacture of wood and of products of wood ...
Manufacture of paper products
Retail trade, except of motor vehicles and motorcycles
Other Consumer Goods manufacturer
Support activities for crop production
Manufacture of chemicals and chemical products
Manufacture of basic pharmaceutical products
Accommodation
Manufacture of furniture
Manufacture of machinery and equipment n.e.c

List B

Crop and animal production, hunting and related service activities
Manufacture of food products
Manufacture of beverages
Manufacture of tobacco products
Manufacture of textiles
Manufacture of wearing apparel
Manufacture of leather and related products
Wholesale trade...
Biofuel
Real estate activities
Forestry and logging
Fishing and aquaculture
Sports activities and amusement and recreation activities
Manufacture of wood and of products of wood ...
Manufacture of paper products
Retail trade, except of motor vehicles and motorcycles
Other Consumer Goods manufacturer

List C (related to IFC PS6)

Mining of coal and lignite
Extraction of crude petroleum and natural gas
Mining of metal ores
Other mining and quarrying
Manufacture of computer, electronic and optical products
Electricity, gas, steam and air conditioning supply
Construction of buildings
Civil engineering

List D (related to SBTi FLAG)

Forest and paper products (forestry, timber, pulp and paper); food production (agricultural production);
Food production (animal source);
Food and beverage processing;
Food and staples retailing; and
Tobacco

AND companies in any other sector with FLAG-related emissions that total more than 20% of overall emissions across scopes. The 20% threshold should be accounted for as gross emissions, not net (gross minus removals).

Figure 1: Decision-tree to enable companies to understand the target-setting requirements as it relates to setting of no-conversion of natural ecosystems

- *See here for IFC Performance Standard 6 requirements*
- *See here for SBTi FLAG requirements*
- *See here for SBTN's Interim Target Framework requirements*

1.4 What is the target?

Companies in certain sectors, with material land pressures, will commit to no conversion of natural ecosystems after a fixed **cut-off date** (see Box 3). The target dates are differentiated according to the level at which a company operates along supply chains, the type of commodities sourced, and the origins of those commodities. The targets are also differentiated in terms of coverage of sourcing volumes included in the targets.

Box 3 - Defining cut-off dates and target dates

Cut-off dates: To assess whether land conversion has occurred, land use change events are considered over an assessment period lasting from a cut-off date until the present. The cut-off date provides a baseline for the target; after this date, any conversion of natural ecosystems on a given site renders the materials produced on that site non-compliant with a no-conversion target.

As recommended by the Accountability Framework initiative (AFi), cut-off dates

should align with existing sectoral or regional cut-off dates where they exist, such as the Amazon Soy Moratorium, and cut-off dates associated with certification and,

for deforestation should not be later than 2020.

Target dates: are the time by which companies must achieve their Land targets.

For SBTN Land target 1 (No Conversion of Natural Ecosystems), **companies *must* use cut-off dates no later than 2020 as the reference for assessing conversion of natural ecosystems** (forests and non-forests). When sectoral or regional cut-off dates earlier than 2020 exist, companies *must* use those earlier dates.

As per the table below, SBTN's no conversion of natural ecosystems target dates differ according to the level at which a company operates along supply chains, the type of commodities sourced, and the origins of those commodities (see section below the table for the definition of Group 1 ecosystems). Companies *can* *and* *should* define target dates more ambitious than those required, should they be able to meet the requirements in less time.

Table 7 – No conversion targets: stages of the value chain and their defined target dates. "List A commodities" and "List B commodities" are outlined in Annex 1

Target requirements			
Stage of value chain	**Location of operation**	**Deforestation and conversion free (DCF) target**	
Site owners/operators	All ecosystems	**2025**: 100% deforestation and conversion free (DCF) across all sites	
Producers	All ecosystems	**2025**: 100% deforestation and conversion free (DCF) across primary and secondary commodities (A commodities and B commodities)	
Stage of value chain	**Origin of commodities**	**A- commodities + 10 % threshold of materiality**[24]	**B – commodities**
Direct sourcing	Group 1 ecosystems	**2025**: 100% DCF	
	Other ecosystems	**2027**: 80% DCF **2030**: 100% DCF	
Indirect sourcing (non-embedded)	Group 1 ecosystems	**2025**: 80% DCF **2027**: 100% DCF	**2027**: 80% DCF **2030**: 100% DCF
	Other ecosystems	**2027**: 80% DCF **2030**: 100% DCF	**2030**: 100% DCF
Indirect sourcing (embedded or highly transformed)	Group 1 ecosystems	TBC (see question for reviewers below)	
	Other ecosystems		

Question for reviewers: We are open to providing other options for compliance of embedded/highly transformed volumes other than validation of 100% DCF status. This may include compensation for embedded volumes in the form of payments to producers or investments in landscape initiatives. Please provide suggestions as to what appropriate targets might be for these volumes.

1.4.1 Group 1 ecosystems

No conversion targets differ according to the location of operations and origins of commodities (see column 2 in the table above). Group 1 ecosystems refers to places with specific ecological importance that require immediate action to prevent conversion due to:

1. Existing laws and initiatives which include commitments to deforestation and conversion free
2. Maintaining ecosystem intactness
3. Extinction/collapse risk, irreplaceability, or natural uniqueness
4. Critical natural assets

[24] Based on TCFD materiality threshold

5. Areas of social or cultural heritage or importance

Question for reviewers: In designating the ecosystems that should be prioritized based on the table above there are a few options for how SBTN Land can proceed. We seek your comments, suggestions and feedback regarding these options:

A. Group 1 ecoregion approach (forests + priority commodity engagement areas e.g. Cerrado, Chaco, etc.): Here Group 1 includes all natural forests and geographic areas where significant data and analytical capacity exist to track company commitments to a no conversion of natural ecosystems target.
B. Group 1 spatial data layer approach: Corporate sourcing footprints are spatially assessed using the SBTN Natural Lands map (see more detail in technical annex 3) and additional [Group 1] prioritization is given based on the data layers explored below (global soil conservation hotspots, minimum land area for conserving terrestrial biodiversity, etc.)
C. Combining the spatial data components of option B with deforestation driver analysis to be sure that a commodity's country/state high risk areas are covered by the Land target.

Key questions for reviewers:

1) All natural ecosystems will eventually be covered during the Land target timeframe, is it helpful to companies to rely on prioritized areas or ecosystems before 2030?
2) What are the trade-offs among these options that you see regarding feasibility and coverage of forest and non-forest ecosystems?
3) Is a spatial approach to highlighting priorities worth the effort if companies cannot provide geographic sourcing data at better than sub-national scale?
4) Is there an option that you prefer?

The delineation of the areas that comprise [Group 1] is based on several datasets and analyses that provide a way to better understand the priority of different areas of natural ecosystems for *no conversion*.

Of direct relevance to [Group 1] is the inclusion of all natural forests since many companies have existing deforestation free commitments with a 2025 target date.

Allan et al. 2022[25] identify the minimum land areas for conserving terrestrial biodiversity which unites into a single data layer:

- Protected areas,
- Key Biodiversity Areas,
- large intact ecosystems, and
- additional areas where limiting their conversion will prevent increases in extinction risk.

[25] Allan, J.R., Possingham, H.P., Atkinson, S.C., Waldron, A., Di Marco, M., Butchart, S.H.M., et al. (2022). The minimum land area requiring conservation attention to safeguard biodiversity. Science, 376, 1094–1101.

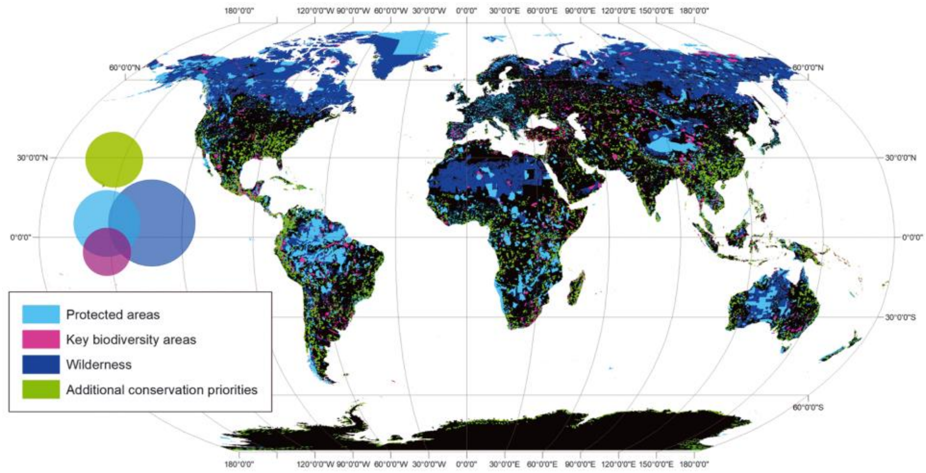


Figure 2 – Minimum land areas for conserving terrestrial biodiversity. Source: Allan, J.R., Possingham, H.P., Atkinson, S.C., Waldron, A., Di Marco, M., Butchart, S.H.M., et al. (2022). The minimum land area requiring conservation attention to safeguard biodiversity. Science, 376, 1094–1101.

[Group 1] also includes ecosystem areas that have been assessed by the IUCN Red List of Ecosystems as "threatened". While these assessments are not global in coverage, including those areas that have been assessed provides an additional buffer against the conversion of threatened ecosystems for those areas that have been assessed.

An important addition to the [Group 1] classification are hotspots for the ecological conservation of soils, as described in Guerra et al. (2022).[26]

Research indicates that above ground proxies for conservation importance do not align well with the conservation requirements for belowground biological diversity.[27] Soil is obviously a critical component of land systems not only for human health and well-being, but also for economic productivity, but it is also especially vulnerable to the impacts of ecosystem conversion and to human use and disturbance.

Including areas important for soil conservation as [Group 1] helps to ensure that natural ecosystems that also have high soil conservation value are captured in SBTN Land's No Conversion of Natural Ecosystems target.

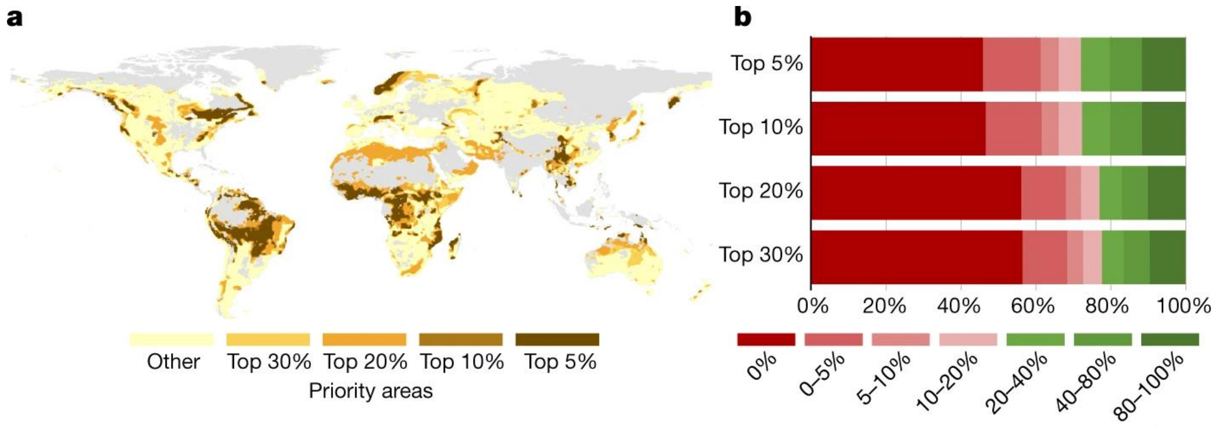


Figure 3 – Hotspots for the ecological conservation of soils. Source: Guerra, C.A., Berdugo, M., Eldridge,

[26] Guerra, C.A., Berdugo, M., Eldridge, D.J., Eisenhauer, N., Singh, B.K., Cui, H., et al. (2022). Global hotspots for soil nature conservation. Nature, 610, 693–698.
[27] Burton, V.J., Contu, S., De Palma, A., Hill, S.L.L., Albrecht, H., Bone, J.S., et al. (2022). Land use and soil characteristics affect soil organisms differently from above-ground assemblages. BMC Ecol Evo, 22, 135.

D.J., Eisenhauer, N., Singh, B.K., Cui, H., et al. (2022). Global hotspots for soil nature conservation. Nature, 610, 693–698

Analyses by Chaplin-Kramer et al. (2022) have identified the 30% percent of global land area that is needed to provide 90% of the total current magnitude of 14 different types of nature's contributions to people (NCP). Conversion of these areas, termed "critical natural assets" should be avoided.

Finally, the delineation of areas of specified cultural heritage or importance is a key addition to [Group 1].

SBTN Land cannot hope to provide comprehensive guidance for companies on where to avoid the conversion of natural ecosystems without a consideration of natural ecosystems that have cultural or social importance for people. In fact, any guidance on where decisions regarding the conversion of natural ecosystems are made, companies should ensure that such conversion has received free prior and informed consent (FPIC).

In an effort to provide additional guidance for companies on areas where conversion should be avoided we refer to Garnett et al (2018)[28] as a reference. However, this guidance in no way supplants the sovereignty and license of Indigenous people in the management of their lands, whether tenure is secured or not and is intended as broad guidance within a company's No Conversion target.

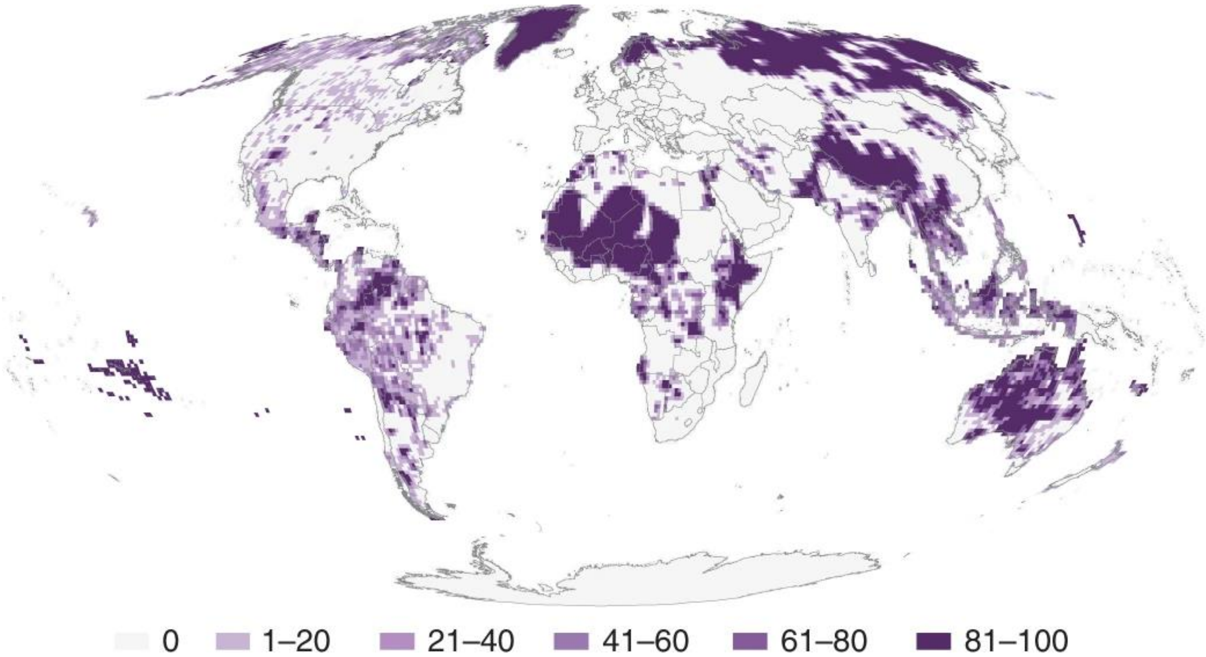


Figure 4 – Global map of lands managed and/or controlled by Indigenous Peoples. from: Garnett, S.T., Burgess, N.D., Fa, J.E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C.J., et al. (2018). A spatial overview of the global importance of Indigenous lands for conservation. Nat Sustain, 1, 369–374. Note: (percent of each degree square mapped as Indigenous in at least one of 127 source documents). Blank areas do not necessarily indicate an absence of Indigenous Peoples or their lands, but rather areas for which an Indigenous connection cannot be inferred based on publicly available geospatial data. Note that the equal area Mollweide projection adopted gives appropriate weight to tropical regions where most Indigenous Peoples have land but at the expense of accuracy in shape which can make it difficult to determine Indigenous lands in some countries on the margins of the map, such as New Zealand.

[28] Garnett, S.T., Burgess, N.D., Fa, J.E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C.J., et al. (2018). A spatial overview of the global importance of Indigenous lands for conservation. Nat Sustain, 1, 369–374.

Following the spatial identification of areas as *Natural Lands* by SBTN's map, these areas will be further assessed as priority [Group 1] areas based on the datasets mentioned in this section.

- For company direct sourcing that overlaps with these areas companies will be required to commit to 100% no conversion of these areas by 2025.
- For Indirect Sourcing companies will be required to ensure 80% compliance with no conversion of [group 1] areas by 2025 and 100% compliance by 2027.

Table 8 – No conversion of natural ecosystems target-setting guidance for direct operations and sourcing companies

No conversion of natural ecosystems target setting				
Stage of value chain	**Data requirements**	**Where to account for conversion**	**Coverage**	**Options available to meet target requirements**
Direct operations	Company [x] has fulfilled data requirements listed in section 1.6 In summary, data requirements are met when all production units and project sites are demarcated by georeferenced boundaries (i.e., polygons), with the exception of small sites (e.g., less than 10ha), for which one point coordinate near the centre of production may be sufficient.	Account for conversion at the level of production unit. Producers of high impact commodities and companies owning and managing mines and project sites must account for Land Use Change at the Production Unit/Project Site. Conversion must be accounted starting from the cut-off date to the year before submitting the target for validation.	All production units and project sites with a no conversion target.	New conversion cannot occur after the cut-off date. Existing post- cut-off date conversion must be remediated. Refer to Accountability Framework's Operational Guidance on Environmental Restoration Compensation for general guidelines on remediation of natural ecosystem conversion. However, special consideration is required for conversion of [Group 1] geographies – further guidance is forthcoming.
Direct Sourcing (sourcing from producers and from first point of aggregation)	Company [x] has collected necessary data as per section 1.6 In summary, data requirements are met when all volumes of high-risk, land-intensive commodities purchased are traceable to production unit or sourcing area.	Account for conversion at the level of production unit or sourcing areas. Companies directly sourcing high-impact commodities must account for Land Use Change at the Production Unit/Project Site or at the Sourcing area levels.	Cover all volumes sourced of high impact commodities with a no conversion target.	Sourced volumes must be deforestation and conversion-free Directly join or support producers in their remediation efforts.

No conversion of natural ecosystems target setting				
Stage of value chain	Data requirements	Where to account for conversion	Coverage	Options available to meet target requirements
		Conversion must be accounted starting from the cut-off date to the year before submitting the target for validation.		
Indirect Sourcing (non-embedded)	Data requirements are met when all volumes of high-risk, land-intensive commodities purchased are identified and communicated following these requirements: volumes disaggregated per commodity and per traceability level – production unit, sourcing area/jurisdiction/subnational level of origin, national level of origin, global sourcing data.	Account for conversion at the level of production unit or sourcing areas. Companies indirectly sourcing high-impact commodities must account for Land Use Change at the Production Unit/Project Site or at the Sourcing area levels (for all volumes traceable) Conversion must be accounted starting from the cut-off date to the year before submitting the target for validation (for all volumes traceable) Untraceable volumes must be disclosed following the reporting requirements.	Cover all volumes sourced of high-risk, land-intensive commodities with a no conversion target.	Sourced volumes must be conversion free. Compensate non-compliance volumes with payments/incentives to eliminate conversion from [Group 1] list of ecosystems. – further guidance is forthcoming

No conversion of natural ecosystems target setting				
Stage of value chain	**Data requirements**	**Where to account for conversion**	**Coverage**	**Options available to meet target requirements**
Indirect Sourcing (embedded and highly-transformed volumes)	Data requirements are met when all volumes of high-risk, land-intensive commodities purchased are identified and communicated following these requirements: volumes disaggregated per commodity and per traceability level – production unit, sourcing area/jurisdiction/subnational level of origin, national level of origin, global sourcing data.	Account for conversion at the level of production unit or sourcing areas. Companies indirectly sourcing high-impact commodities must account for Land Use Change at the Production Unit/Project Site or at the Sourcing area levels (for all volumes traceable) Conversion must be accounted starting from the cut-off date to the year before submitting the target for validation(for all volumes traceable) Volumes traceable only to national level or untraceable must be disclosed following the reporting requirements.	Cover all volumes sourced of high-risk, land-intensive commodities with a no conversion target.	Sourced volumes must be deforestation and conversion free. Compensate via direct payments/incentives to reduce conversion in [Group 1] areas by 2030. – further guidance is forthcoming

1.5 Defining, mapping, and measuring natural ecosystem conversion

The relevance of a no conversion target can be approached through considering areas of direct operations, the activities of upstream suppliers, and the activities of downstream users. This v1 guidance outlines target setting for direct operations and upstream sourcing but does not address downstream impacts yet.

The process and conditions around measuring conversion of natural ecosystems, allocating responsibility for such conversion, and setting targets will be divided into:

- methods for setting no conversion targets on direct operations and
- targets around upstream sourcing of goods or services that lead to land conversion.

For this method, preventing the conversion of natural ecosystems started from defining natural lands and estimating where they exist by delineating them into a map. To this purpose, the Land Hub selected the definition of natural ecosystems provided by the Accountability Framework (AFi) and used it to inform the creation of a natural lands map, developed in collaboration with World Resources Institute Land and Carbon Lab.

The approach for identifying natural lands across the globe was to combine the best available global spatial data on land cover/land use into a single harmonized map at a 30-meter resolution.

Where available, local/regional data has been incorporated and prioritized to ensure that regional knowledge is reflected in the map. The AFi definition of natural ecosystems has been operationalized based on existing landcover/land use data. Land cover data that were best for distinguishing between natural and non-natural land covers have been assessed and selected, using additional data where necessary (see: technical documentation of Global Maps of Natural Lands).

The Accountability Framework defines a **natural ecosystem** as "one that substantially resembles – in terms of species composition, structure, and ecological function – what would be found in a given area in the absence of major human impacts" and can include managed ecosystems as well as degraded ecosystems that are expected to regenerate either naturally or through management (Afi 2019).

While natural forests are of course part of natural ecosystems, a detailed forest definition is also provided by Afi.

Forests are defined as "land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or other land use" (Afi 2019).

And **natural forests** are defined as possessing "many or most of the characteristics of a forest native to the given site, including species composition, structure, and ecological function."

Natural forests include primary forest, regenerated second-growth forests, managed natural forests and forests that have been partially degraded. Natural forest and tree plantations are considered to be mutually exclusive (Afi 2019).

Afi's conversion definition is used also in anticipation of using the natural ecosystem map for monitoring purposes, which includes "a change to another land use or profound change to composition, structure, or function" (Afi 2019). Conversion can happen regardless of whether or not the change was legal.

Additional ecosystem classes were included in the map:

- grasslands,
- water,
- snow/ice, and
- wetlands.

In the absence of specific definitions for these ecosystems from Afi, the map is built on other definitions from available data. Here, grasslands are defined as areas of land with vegetation shorter than 5 meters and can include areas of land dominated by grass or shrubs. Water is defined as surface water present 20% or more of the year. Snow and Ice include any permanent snow and ice. Wetlands are transitional ecosystems with saturated soil that can be inundated by water either seasonally or permanently and can be covered by short vegetation or trees.

The land cover classes included in the map are largely drawn from two maps of global land cover for 2020:

- (a) WorldCover, a 10-meter resolution dataset created by the European Space Agency (ESA) (Zanaga et al. 2021), and
- (b) Global Land Use and Land Cover Change, a 30-meter resolution dataset created by the Global Land Analysis and Discovery Lab at the University of Maryland (UMD) (Hansen et al. 2022; Potapov et al. 2022).

Both share a similar classification scheme and were compared to decide which made a "best fit" for this map (Table 2A and 2B of the full technical documentation of the Global map of natural lands).

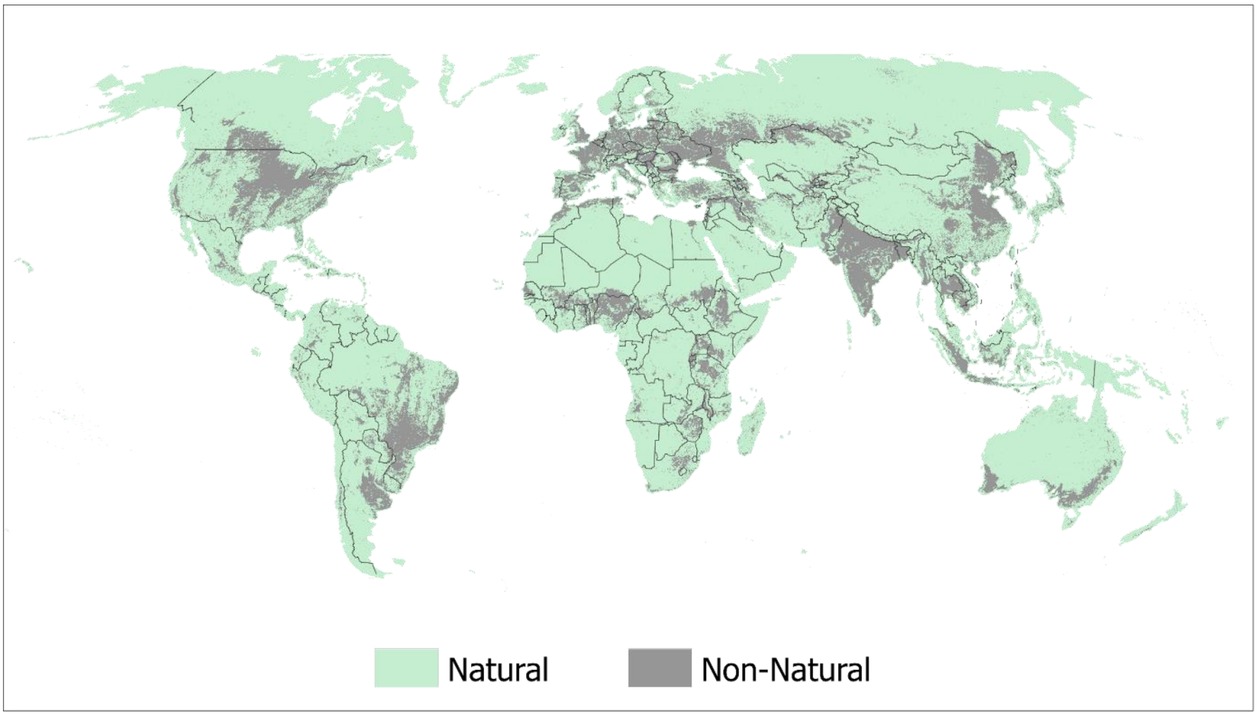


*Figure SEQ Figure * ARABIC5: Global map of natural lands. Note to the figure: there is no data on the glaciers of Greenland. Global scale of map obscures data at smaller scale*

Map can be accessed here: https://wri-datalab.earthengine.app/view/sbtn-natural-ecosystems

Technical documentation can be found here: https://docs.google.com/document/d/1v23aNnkg77JiUIdD9cU-C4MD4AC0TH70Ay3hfkrY72A/edit?usp=sharing

Purpose and usability of the natural lands map

The newly created natural lands map will:

- Allow companies to estimate natural ecosystem conversion for which they have some responsibility since 2020;
- Provides a 2020 baseline for *no conversion* calculations agreed upon by a broad membership of organizations including those of the SBTN Land Hub and The Accountability Framework Initiative (Afi).

The natural lands map will **not**:

- Be a resource for scientific research and analysis.
- Supplant existing research and biophysical mapping and analysis on ecosystem science
- Define ecosystems and/or working lands
- Be used to assess the quality of ecosystems, including value for biodiversity

This map demonstrates a conservative approach to mapping non-natural lands, meaning that decisions were made with the aim to be precautionary in assigning a non-natural classification.

Due to the lower resolution and variation in accuracy of some of the input data, additional data were used, where available, to apply additional conditions before removing non-natural classes as an added precautionary step. As a result of the conservative approach, the final dataset may overestimate the area of natural lands in some regions.

Due to this, it is essential that this map be strictly applied to setting a corporate "no conversion of natural ecosystems" target in SBTN Land and not used to assess the extent of natural or non-natural ecosystems.

More details on how to use the map in Annex 3.

1.6 Data requirement and accounting guidance

This section identifies what data companies need to collect to be able to set a target on no conversion of natural ecosystems.

The section further explains how companies can account for conversion of natural ecosystems consequential to the production or procurement of land-based commodities and/or products containing them.

Data requirements

To set a target on no conversion of natural ecosystems, companies will need data on:

- Location and area of production units of high impact commodities that they own or manage (see definitions for ownership and high impact commodities in Step 1 methods)
- Location of mines and project sites (e.g., infrastructure and construction sites) that they own or manage
- Origin and volumes of high impact commodities at the production unit level or sourcing area level. When origin of all commodities is not yet known at this scale, companies should disclose the volumes of each commodity that is of unknown origin or known only to the country level.

- Amount of natural ecosystem conversion that occurred later than the company's cut-off date on sites it owns or manages, on production units known to be in its supply chains, or in sourcing areas from which it sources commodity volumes.

Data requirements vary according to the stages of the value chains where a company operates. Please refer I.iv, footnotes of table 5, for the definitions of stages of the value chain.

Table 9 - Minimum data requirements for measuring and estimating conversion of natural ecosystems

Stage of the value chain	Data Requirement	Data Sources	Unit of Measurement
Direct operations (Producers and project site operators)			
- Producers of agricultural commodities - Producers of forestry products - Mining companies - Infrastructure and construction companies	Locations of all sites where high impact commodities are produced. Locations of all mining and project sites. Area converted after cut-off date		Production Unit [Hectares] Mining sites [Hectares] Project sites [Hectares]
Direct sourcing			
Upstream Activities (Supply chain)	Production Unit or Sourcing Area of high impact commodities purchased Area converted after cut-off date		Production Unit or Sourcing Area [Hectares]
	Volumes of high-risk land-intensive commodities purchased from each production unit or sourcing area.		[metric tonnes or equivalent]
Indirect sourcing			
Upstream Activities (Supply Chain)	Preferred: Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased		Production Unit or Sourcing Area [Hectares]
	Volumes of high-risk land-intensive commodities embedded into complex products purchased		[metric tonnes or equivalent]

Accounting for conversion of natural ecosystems

The following guidelines on accounting have been taken from the AFi's guidance and adapted to the scope of this target setting methodology. The term land use change is kept here in alignment with GHG Protocol's accounting guidance.

In order to effectively set and achieve targets to end deforestation and conversion from operations and supply chains, companies *must* measure and account for land use change in credible and consistent ways. This process is key also to account for LUC emissions for setting SBTi FLAG targets. After having completed the accounting exercise, companies will then use the map to understand which portion of land use change is conversion of natural ecosystems.

Scale at which to assess land use change

Land use change *may* be assessed based on production unit-level information and/or estimated based on the attribution of conversion occurring at the level of the sourcing area. The parallel processes for calculating land use change emissions are called direct and statistical land use change, respectively. (see relevant section the AFi guidance document and Chapter 7 of the GHG Protocol Land Sector and Removals Guidance).

The determination of the appropriate scale of analysis will largely depend on the ability of the company to trace products through the supply chain to their origin, as well as the extent to which that origin is associated with risk of deforestation or ecosystem conversion and the appropriate scale of management given the context of production and sourcing.

Box 4 5 - Information on traceability from the latest Afi guidance

For companies that purchase agricultural or forestry commodities, traceability is necessary to determine the origin of the materials in their supply chains and ascertain when land use change took place in these locations of origin. Traceability may be facilitated by internal company systems, business-to-business disclosure by suppliers, third-party certification programs, or other methods for attaching information about origins to product volumes. Traceability to the production unit of origin is preferable in most cases and allows for the highest level of supply chain control and the most precise land use change accounting. However, recognizing that full traceability to production units is not always available, and that in some context a sourcing area or jurisdiction may be the most relevant scale for managing deforestation and conversion risks, this guide also explains how deforestation/conversion and associated emissions can be estimated at an area level.

There are three primary scales at which land-use change can be assessed:

1. Traceability to the production unit of origin means that companies are able to trace commodity volumes to specific mapped production unit(s), such as farms, ranches, plantations, or forest management units. The Accountability Framework defines a production unit as a discrete land area on which a producer cultivates crops, manages timber, or raises livestock. A production unit will generally be a contiguous land area or proximate group of plots managed by the same owner, regardless of any internal subdivisions. Production units should be demarcated by geo-referenced boundaries (i.e., polygons), with the exception of small sites (e.g., less than 10 ha), for which one point coordinate near the center of the production may be sufficient. The same approach explained for production units can be used for project sites (e.g., mining sites, construction sites).
2. Traceability to the sourcing area means that products are traceable to a known area or region where the material was produced (or extracted), but that the specific production unit of origin is not known. Sourcing area-level boundaries could include a sourcing radius from a first point of collection or processing facility (e.g., a radius from a palm oil mill), a defined production landscape (e.g., the area covered by a smallholder cooperative), or a subnational jurisdiction (e.g., municipality).
3. Limited or no traceability means that product can only be traced to a country of origin or that the origin of products is unknown.

Table 10 – Appropriate measures of land use change and associated LUC emissions. Source: Accountability Framework Initiative

Level of traceability and monitoring	Position in the supply chain	Unit of analysis	Accounting metrics & methods for...	
			deforestation and conversion (disaggregated by commodity)	emissions from land use change
Production unit (Section 4.3)	Own operations (scope 1 emissions)	Own farms/ plantations	• Hectares of deforestation or conversion in operations since cutoff date • % of total ha owned or managed that this represents	Scope 1 dLUC (tons CO_2 equivalent)
	Supply chain (scope 3 emissions)	Known supply chain farms/ plantations	• Hectares of deforestation or conversion on production units in supply chain since cutoff date • % of total ha on known farms that this represents	Scope 3 dLUC (tons CO_2 equivalent)
Sourcing area (Section 4.4.1 and 4.4.2)	Supply chain (scope 3 emissions)	Known sourcing (e.g. mill sourcing radius, production landscapes, or subnational jurisdictions)	Hectares of natural ecosystem conversion in sourcing area since cutoff date that may be attributed to the company	Scope 3 sLUC (tons CO_2 equivalent)
Limited or no traceability (Section 4.4.3)	Supply chain (scope 3 emissions)	Country of origin	Volume of materials (and proportion of total) sourced from each country*	
		Unknown origin	Volume of materials (and proportion of total) sourced for which origin is unknown*	

* When there is limited to no traceability, hectares of deforestation and conversion cannot be estimated.

Accounting for land use change at the production unit

Monitoring land use change at the level of production units (e.g. farms, plantations, and forest management units) provides the greatest amount of precision about the impact of commodities in company operations and supply chains and is the best way to determine whether products are linked to recent deforestation or conversion.

When accounting for deforestation and conversion at the site level, all conversion in the production unit that has occurred since the cutoff date (for deforestation/ conversion) or during the assessment period (for LUC emissions) *must* be included, regardless of the current use of that land (i.e., whether it is used to cultivate the commodity of interest, to cultivate another commodity, has not yet been cultivated, oris not currently being cultivated).

Accounting for land use change at the sourcing area

Accounting for deforestation and conversion associated with agricultural and forest commodities at the scale of a sourcing area *may* be appropriate in a range of circumstances, including when:

- Downstream companies do not have physical traceability to the production unit level
- Sourcing area is the most relevant scale for managing deforestation and conversion risk
- Companies source from jurisdictions or landscapes where it can be shown that there has been no or negligible recent conversion.

It is *recommended* that, when allocating land use change at an area level to specific commodity volumes, all land use change that may be related to agriculture (for crop or livestock products) or forestry (for forest products) is included in the analysis. Consideration of all agriculture- or forestry-related land use change allows companies and others to best account for varied land use change trajectories or indirect land use change pressures, providing an appropriately conservative approach to allocation.

The GHG Protocol provides two recommended approaches for allocating land use change in a given area (see AFi guidance and Chapter 7 and 17 of the GHG Protocol Land Sector and Removals Guidance):

1. allocation based on land occupation
2. allocation based on commodity expansion

In all cases, the method and data sources used to allocate land use change and associated emissions to products within a sourcing area *must* be clearly disclosed.

Please consult Annex 2 for additional information on accounting.

1.7 Target validation

To begin the target validation process companies *must* submit:

- ISIC sector classification(s) describing their direct operations and upstream activities
- Data required in section 1.6
- Accounting of conversion between cut-off date and the year before targets are submitted (e.g., 2020 – 2023)
- Information covered by reporting requirements listed in section 1.9

1.8 Overview of suggested tools

To achieve no conversion targets, companies need the right tools and accurate data to map and monitor conversion of natural ecosystems, the origins of agricultural and forest products, in order to manage risks and track and report change.

To fulfil monitoring and reporting requirements, companies *can* use a wide range of existing tools and platforms. Two key resources are highlighted for use below.

The Accountability Framework's Toolset: provides guidance on tools and platforms that can support companies in their journey to eradicate deforestation and conversion from direct operations and supply chains.

Global Forest Watch: The GFW Pro platform provides companies with a means to achieve supply chain sustainability with data that delivers impact. Through the platform commodity companies, as well as financial institutions, can securely upload the locations of areas they source from or invest in and assess deforestation risk, monitor historic and ongoing trends in deforestation, and access near-real-time deforestation alerts. In partnership with the Science Based Targets Network, as well as the Accountability Framework Initiative and Greenhouse Gas Protocol, GFW Pro will soon empower companies with a means to monitor deforestation compliance, and thereafter conversion and associated emissions.

1.9 Reporting requirements

Companies that set a no conversion target will be *required* to report information on deforestation and conversion footprint on an annual basis.

Companies are required to disclose transparently the following information to SBTN:

- Deforestation and conversion footprint in their operations
- Commodity volumes in their supply chains disaggregated per level of traceability as follows:
    - Traceable to production unit
    - Traceable to sourcing area/jurisdiction/subnational level
    - Traceable to country of origin
    - Not traceable
- For all volumes must be indicated the percentage that is assessed to be deforestation free.

Annual reporting will ensure that SBTN and other stakeholders will be able to have a clear view on how the company is progressing towards the achievement of their target.

In alignment with AFi, this guidance suggests companies to disclose this information by using CDP forests questionnaire[29] and by following the GRI Agriculture, Aquaculture, and Fisheries Sector Standard[30].

[29] https://guidance.cdp.net/en/guidance?cid=31&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=Guidance&tags=TAG-646%2CTAG-609%2CTAG-600

[30] https://www.globalreporting.org/standards/standards-development/sector-standard-for-agriculture-aquaculture-and-fishing/

Land Occupation Reduction

This chapter of the SBTN Land Guidance sets out:

1. Key definitions relevant for this target
2. Information on **<u>why</u>** the target is needed
3. Information on **<u>who</u>** needs to set the target
4. Information on **<u>what</u>** the target looks like for different companies depending on direct operations and upstream sourcing of commodities
5. Information on **<u>how</u>** to set, report and communicate the target
6. A technical annex articulating the scientific basis of the target

*Box SEQ Box * ARABIC4: Land target 2: formulation of the land occupation reduction target*

TARGET:

[Company name] commits to reduce absolute land occupation, from direct operations *[and upstream impacts]*, [*percent reduction] %* by [*target year]* from a [*base year]* base year.

2.1 Key definitions relevant for this target

Land occupation*:* Land occupation is the amount of land occupied for a certain time to produce a product. For purposes of annual tracking and target-setting by companies, it is defined as the amount of land required per year to produce or extract the products produced or sourced by a company. It is reported in hectares per year.[31]

Importantly, "land occupation" for the purpose of target-setting related to Land SBTs refers to "working lands" used to produce or extract land-based products—not necessarily all land owned or controlled by companies.

Please note as well that land occupation is referred to as *terrestrial ecosystem use* in the SBTN Technical Guidance for Steps 1 and 2 and is one of the eight main environmental pressures that SBTN companies are required to assess in Step 1.

2.2 Why is the target needed?

Expansion of agriculture, forestry, and other land use is the leading driver of natural ecosystem conversion. Therefore, while companies set targets to end natural ecosystem conversion (ecosystem use change), it is also important to set targets to limit or decrease pressure on those natural ecosystems by reducing the amount of land occupied by human activities (terrestrial ecosystem use) to free up land for ecosystem restoration.

This version of Land targets only requires companies producing or sourcing agricultural products (e.g., food, animal feed, fibres, bioenergy feedstocks) to set a land occupation reduction target. This is because agriculture (including cropland and pastureland) is the world's largest user of land and because a number of studies (detailed in Table 14) have modelled needed reductions in agricultural land occupation. Subsequent versions of Land SBTs will explore the applicability of the target-setting methodology for other major users of land such as forestry, mining, and infrastructure.

As mentioned in the key terminology section above, "land occupation" for the purpose of target-setting related to SBTN Land targets refers to working lands used to produce or extract land-based products—not necessarily all land owned or controlled by companies. The implications of this are that occupation reductions cannot be applied to extensive land holdings held in reserve but must be applied to land under current production. Land occupation includes both direct operations and upstream impacts, as detailed in the SBTN

[31] (GHG Protocol Land Sector and Removals Guidance, forthcoming).

Technical Guidance for Steps 1 and 2 (SBTN forthcoming). Lands that are not attributable to direct operations or upstream value chain activities should not be counted within the Land Occupation Reduction target.

For crops and livestock products, land occupation refers to all agricultural land: cropland and land under permanent meadows and pastures (FAO 2022) (Figure 6).

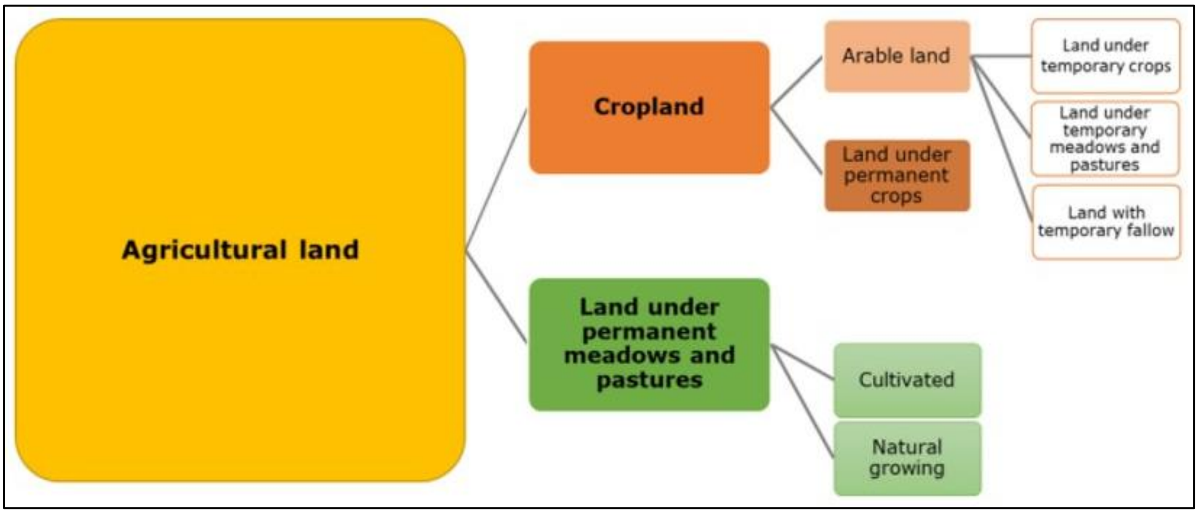


Figure 6 - Components of Agricultural Land in FAOSTAT. Source: Land statistics and indicators: Global, regional and country trends, 2000–2020. FAO 2022. https://fenixservices.fao.org/faostat/static/documents/RL/cc0963en.pdf.

2.3 Who needs to set the target?

The SBTN *requires* companies that meet both of the following two criteria to set a Land Occupation Reduction target:

i) **Companies from the following designated sectors**:

a. Food and Agriculture Production (ISIC A_1)
b. Food Processing (ISIC C_10)
c. Food Manufacturing (ISIC C_11)
d. Tobacco Processing (ISIC C_12)
e. Textile Manufacturing (ISIC C_13)
f. Apparel Manufacturing (ISIC C_14)
g. Leather Manufacturing (ISIC C_15)
h. Rubber Tire Manufacturing (ISIC C_22_221)
i. Wholesale Food (ISIC G_46_461, 462, 463)
j. Wholesale Textiles (ISIC G_46_464)
k. Retail with Food (ISIC G_47_471, 472)
l. Retail Apparel (ISIC G_47_475_4751)
m. Restaurant, Catering & Food Service (ISIC I_56_561, 562)
n. Biomass/Biofuels (ISICD_35_351_3510);

AND

ii) **Companies who surpass AT LEAST ONE of the thresholds below**:

a. Company employs 500 people or more in their own operations (standard definition of the maximum size of a small or medium-size enterprise) AND/OR

b. Company has an estimated baseline land occupation over 100,000[32] hectares (land occupation should be estimated using *Greenhouse Gas Protocol Land Sector and Removals Guidance*, Chapter 7, section 7.3).

The decision-tree below visualizes these requirements and guides companies in understanding their target setting requirements as it relates to land occupation reduction.

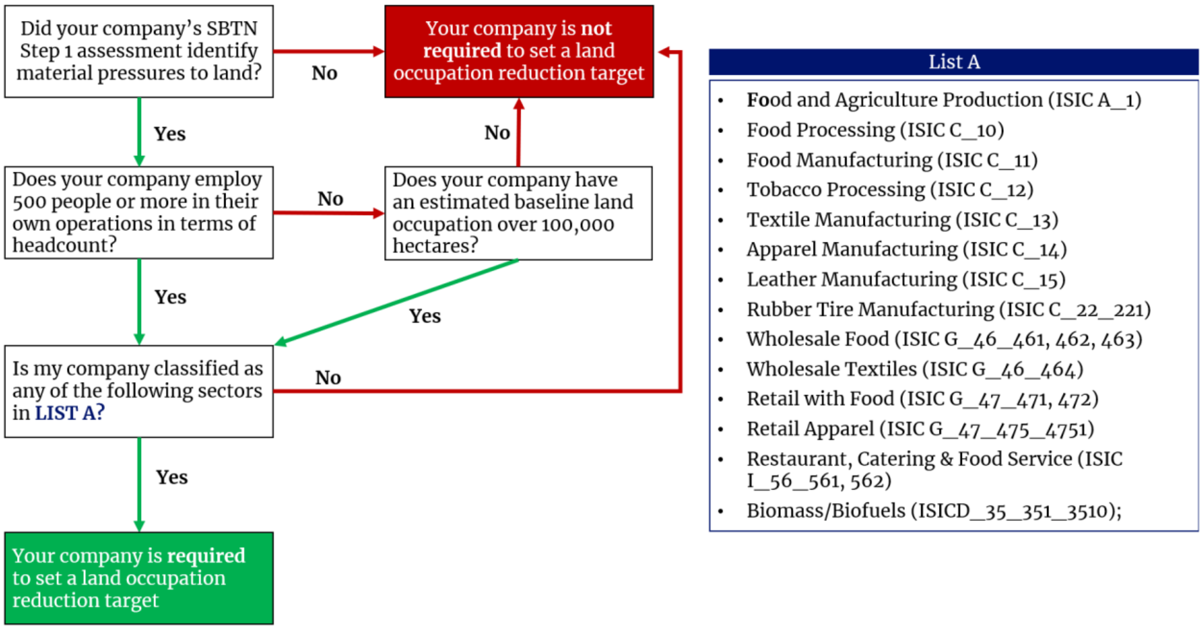


Figure 7: Decision-tree for setting a land occupation reduction target

2.4 What is the target? How companies set, report, and communicate the target

The process to calculate a company's land occupation (whether to set a baseline or an updated annual inventory) is described in the *SBTN Technical Guidance for Steps 1 and 2* (sections 3.1-3.2), and in the *Greenhouse Gas Protocol Land Sector and Removals Guidance* (sections 7.3 and 17.3).

To set a target to reduce land occupation, companies *may* collect spatial or statistical data as follows:

- For purchasing companies with upstream land occupation: statistical (non-spatial) data on quantities of land-based products sourced, and locations (e.g., countries and/or sub-national jurisdictions) if known
- For producing companies with land occupation in direct operations: statistical (non-spatial) data on quantities of land-based products produced, and spatial data on working lands producing those products

Data requirements vary according to the stages of the value chains where a company operates.

[32] Threshold set using 0.05% of total land occupation reduction of agricultural activities estimated using IPCC Special Report on 1.5, 2018, SSP1 scenarios in Figure 2.24 at 200 Mha by 2030 and 500 Mha by 2050.

Table 11 – Data requirements for a Land Occupation Reduction target according to stages of the value chain

Stage of the value chain	Data Requirement	Data Sources	Unit of Measurement
Direct operations (Producers and project site operators)			
E.g., producers of agricultural commodities	Locations and area of all sites where high impact commodities are produced.		Production Unit [Hectares]
Direct sourcing and first point of aggregation			
Upstream Activities (Supply chain)	Production Unit or Sourcing Area of high impact commodities purchased		Production Unit or Sourcing Area [Hectares]
	Volumes of high impact commodities purchased from each production unit or sourcing area.		[metric tonnes or equivalent]
Indirect Sourcing			
Upstream Activities (Supply Chain)	Preferred Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased		Production Unit or Sourcing Area [Hectares]
	Required Volumes of high-risk land-intensive commodities embedded into complex products purchased		[metric tonnes or equivalent]

Note that for statistical data, if the company has already calculated GHG emissions associated with its land-based operations (scope 1) and/or upstream activities (scope 3), in line with reporting via the GHG Protocol or target-setting via the SBTi, the company is likely to already have its "activity data" on quantities of land-based products produced or sourced well-organized for calculating the associated land occupation. The company *may* even be able to use the same environmental database that they used to calculate GHG emissions (e.g., Ecoinvent) to also calculate land occupation. Companies should follow the accounting guidance in the *Greenhouse Gas Protocol Land Sector and Removals Guidance* (sections 7.3 and 17.3) to calculate the land occupation associated with the products they produce or source.

- When using statistical data with quantities of products produced or sourced (e.g., in tonnes), companies can use the simple equation of:

$$\frac{\textit{Quantity of product in tonnes}}{\textit{Yield of that product in tonnes per hectare/per year}} = \text{Land occupation (ha)}$$

- for each product and total up all estimates across all products to have their complete land occupation "inventory" (GHGP forthcoming, Equation 17.12).
- When using spatial data, companies should simply total up the hectares in all of their production areas to estimate total land occupation.

When using statistical data, following the GHG Protocol guidance, companies *should* use the most spatially-explicit data available for each commodity produced or purchased, and seek to improve traceability and data quality over time. If a product origin is unknown, a default assumption (e.g., production assumed to be from the same world region as company headquarters) *may* be used to select the appropriate yield data.

When estimating land occupation of purchased mixed products, companies *should* either try to back-calculate the amounts of raw products for the purpose of estimating land occupation or use reasonable assumptions to simplify the exercise without unduly sacrificing accuracy (e.g., categorizing each mixed product according to its primary ingredient). Because estimating land occupation using statistical data can never be perfect, emphasis *should* be given to estimating the land occupation related to high-impact commodities (e.g., meat stews versus vegetable-based condiments).

2.4.1 Allocation of global land occupation reduction to a company

A common target-setting method under the Science Based Targets initiative (SBTi) (SBTi 2021) is "absolute reduction," in which all companies reduce impacts at the same rate, regardless of baseline performance. Following this SBTi approach, setting targets for land occupation reduction involves setting a corporate target in line with the global target, as shown in Figure 8.

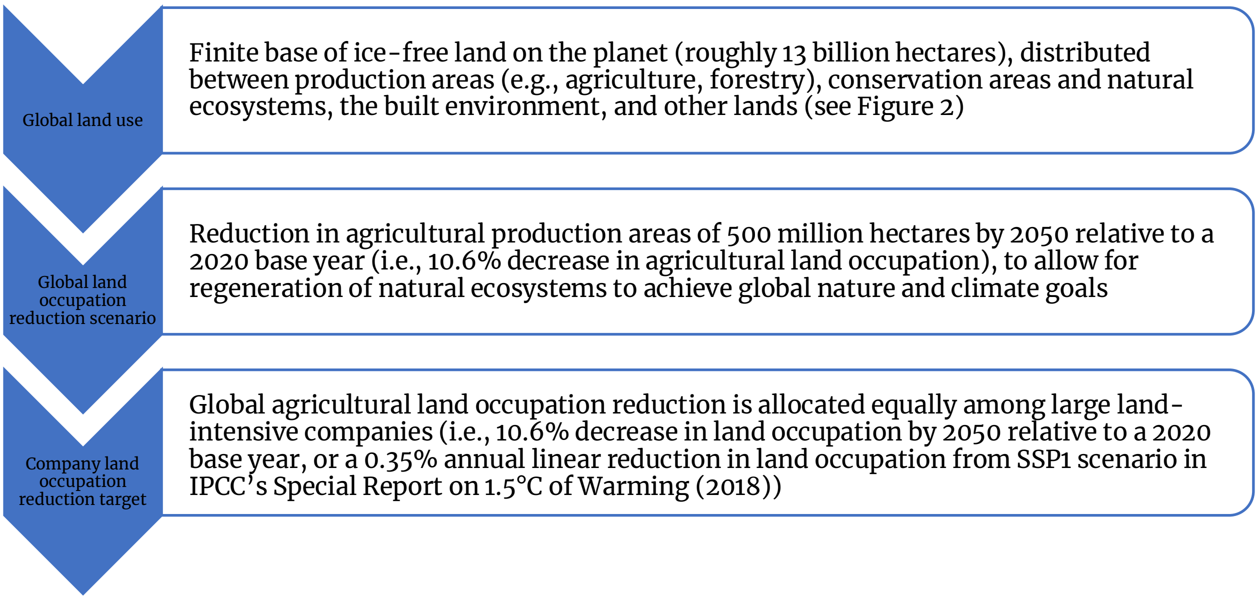


Figure 8 - SBTN Method for Land Occupation Reduction

Through the absolute reduction approach, all companies setting land occupation reduction targets reduce absolute impacts at the same rate, regardless of baseline performance.

Consequently, an absolute reduction target is defined in terms of an overall reduction in the amount of land occupied in the target year, relative to the base year (e.g., reduce annual land occupation 3.5% by 2030, from a 2020 base year). This method is a simple, straightforward approach to set and track progress toward targets that is applicable to the agriculture sector. Table 12 summarizes the inputs and outputs of the method. Box 5 details how a fictional company sets its land occupation reduction target for 2030 with a long-term target for 2050.

SBTi also includes an "intensity reduction" target-setting option, in which companies reduce intensity of impacts per unit of product (e.g., land occupation per kg of food; land occupation per kilocalorie of food). At this time, SBTN *requires* all companies to set land occupation reduction targets using the absolute reduction approach, due to the urgent need to halt and reverse agricultural land expansion in order to end ecosystem conversion and allow for ecosystem regeneration and restoration at scale.

See Annex 5 for additional discussion of the pros and cons of a theoretical intensity reduction approach for land occupation.

Table 12 - Characteristics of the Absolute Reduction Approach

Method	Company Input	Method Output
Absolute Reduction	- Base year - Target year - Sector - Base year land occupation ("terrestrial ecosystem use"), disaggregated by direct operations versus upstream impacts (SBTN Step 1 output)	Overall reduction in the amount of land occupied by the company by the target year, relative to the base year, using a rate of 0.35% annual linear reduction

*Box 5 SEQ Box * ARABIC - Fictional case for setting a land occupation reduction target*

Setting a land occupation reduction target – fictional case of Company X

Company X, a multinational food manufacturing company, sources food products from around the world. They compiled their baseline purchasing data for the year 2022. Using yield data from each country, they applied the equation in the section above (dividing quantities sourced by yields per hectare) to estimate the total number of hectares occupied.

*Table SEQ Table * ARABIC13 - Fictional case for setting a land occupation reduction target*

Note: illustrative yield data from the year 2020 from FAOSTAT (2022).

Company X decides to set an 8-year target to 2030 relative to the base year of 2022. Using the absolute reduction approach with the standard 0.35% linear annual rate of reduction, the company sets its land occupation reduction target at a 2.8% reduction by 2030, relative to the base year of 2022. Looking further ahead, the company also uses the same approach to set a 9.8% land occupation reduction target by 2050, relative to the base year 2022.

2.4.2 Guidelines for choosing corporate response options to deliver Land Occupation Reduction targets

It is well understood in the literature that working with area-based measures can sometimes drive unintended consequences. SBTN understands the limitations of such a metric and thus provides additional guidance on the types of response options companies <u>can</u> focus on in their delivery of the land occupation reduction target and also highlight some safeguards that <u>should</u> be considered in their implementation. Setting multiple SBTN targets (e.g., land, water, climate) for nature should also help companies think through potential trade-offs across response options, and how such trade-offs can be managed. A detailed table of potential response options is included in Annex 6.

- *Increasing yields and production efficiency.* Crop and livestock yields vary widely across the globe, differing between some places by up to an order of magnitude (Herrero et al. 2013). Increasing yields and achieving higher crop and livestock productivity—especially where yields are currently low—is a natural and necessary response to the need to reduce agricultural land occupation even as global food demand continues to grow. Indeed, increased agricultural productivity is a common assumption across all of the scenarios of reduced agricultural land occupation listed in Table 1. However, these productivity gains need to occur with a broader view toward optimizing use of inputs, managing runoff, safeguarding freshwater and soil resources, and improving animal health and welfare. If increased yields are achieved by overuse of fertilizer and agricultural chemicals, or by large-scale irrigation expansion, GHG emissions and water scarcity and/or pollution are likely to increase. Companies should therefore manage interventions with a holistic mindset. Improved soil and water management practices like agroforestry, especially in low-yielding areas, can increase yields while reducing reliance on chemical inputs.
- *Reducing loss and waste.* Approximately one-third of global food production is lost or wasted between the farm and the plate. Rates of loss and waste vary by commodity, region, and supply chain position, but this is another popular and necessary response to reduce land requirements of agricultural supply chains.
- *Producing or sourcing less land-intensive foods.* More than three-quarters of agricultural land globally is used to produce meat, dairy, and other animal-based foods, including both pasture land for grazing and cropland for animal feeds. While the majority of global pasture lands cannot grow crops or trees, and while grazing lands can be an important buffer to natural habitats, nearly a billion hectares of pasture land was formerly forest (Searchinger et al. 2018) and cattle pastures represent a leading driver of recent tropical deforestation (Goldman et al. 2020). In higher-income countries, shifting high-meat diets toward plant-based foods can generally reduce land occupation. Companies should take a holistic approach when considering these options based on the commodities and places where they operate or source.
- *Riparian buffer zones and agroforestry/silvopasture.* Taking lands out of direct production and increasing on-farm set aside areas can contribute to climate mitigation, water filtration, and soil stabilization on working lands. That said, if yields fall this response option can lead to leakage of agricultural land occupation elsewhere (and, potentially other companies' land occupation increasing) given the ongoing growth in global food demand.

2.4.3 Target period and target dates

In alignment with climate targets:

- *The choice of base year __must__ be no earlier than 2015.*
- *SBTN Land __recommends__ companies to choose a base year that is representative of the company's activity (e.g., a year greatly affected by the COVID-19 pandemic should not be chosen as a base year).*
- *Land occupation reduction targets __must__ cover a minimum of 5 years and a maximum of 10 years from the date the target is submitted to the SBTN for an official validation.*
- *Companies are __encouraged__ to develop long-term targets (e.g., to 2050) in addition to near-term targets.*

According to the IPCC Special Report on 1.5, using SSP 1 scenarios approximately 200 million hectares of land that are currently within agricultural production need to be reduced to align with 1.5 degree scenarios by 2030. This reflects a 4.2% reduction from the current 4.8 billion hectares of land currently under agricultural productivity in 2022. This reduction needs to be further advanced out to 2050 to 500 million hectare reduction from current 2022 base year. This reflects a decrease of 10.6% over that time.

Companies that qualify for the Land Occupation Reduction Target should calculate their land occupation area using guidance in Section7 of the Greenhouse Gas Protocol Land Sector Emissions & Removals Standard and set their target amortized by their base year out to 2030.

2.5 Target validation

To begin the target validation process, companies *__must__* submit to SBTN:

- ISIC sector classification(s) for activities within their direct operations and upstream
- Number of employees
- Disclosure of land occupation (from direct operations and from upstream impacts) in the base year 2020
- Activity amounts (quantities of land-based products produced or purchased) in the base year
- Calculation details for base year land occupation (e.g., yield estimates used and sources; spatial data used and sources)
- Calculation details for land occupation reduction target (number of years in the target period between base year and target year; use of 0.35% linear absolute annual reduction rate)

2.6 Overview of suggested tools and databases

Companies *__may__* refer to the SBTN Technical Guidance for Step 1 (Appendix 7; Data and tools under consideration for use in the value chain pressure assessment) and the GHG Protocol Land Sector and Removals Guidance (Section 17.3) for lists of tools and databases that include yields (in tonnes/hectare/year) and/or land occupation factors (essentially the reciprocal of yields, in m2a) that can be used when companies have statistical activity data.

2.7 Scientific basis of land occupation reduction

The world has a finite base of ice-free land, comprising about 13 billion hectares (Bha), and it is already heavily used. Production areas—including cropland, pasturelands, managed and plantation forests, and other used lands—account for the majority of the world's land, with only 16% of land remaining as intact and primary forests and other natural ecosystems as of 2015 (IPCC SRCCL 2019, Figure 9).

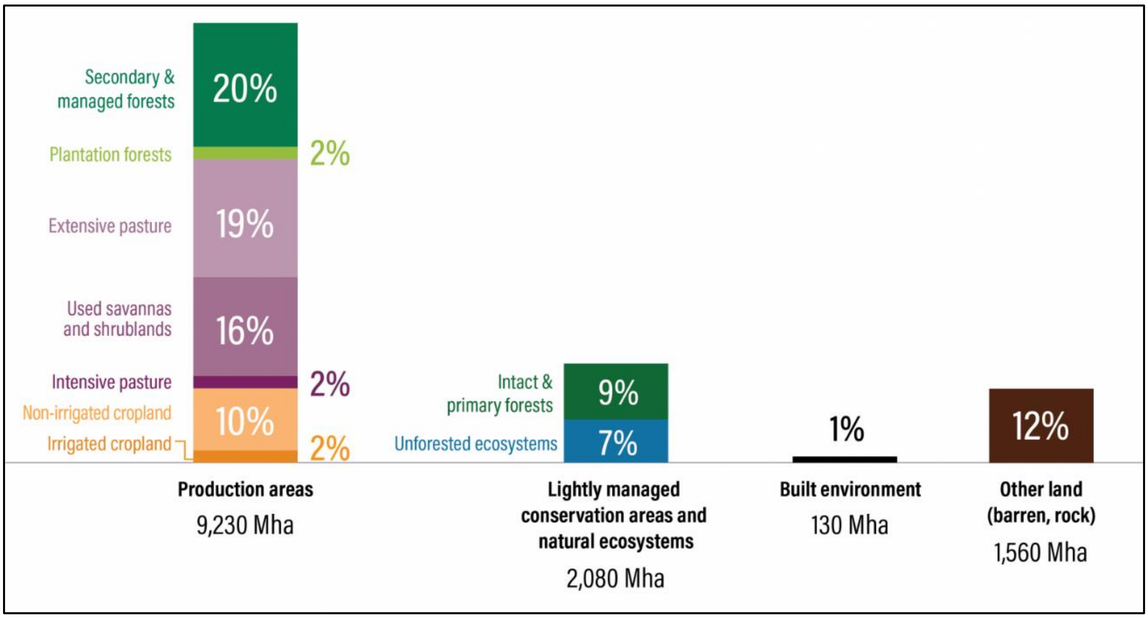


Figure 9: Global land use (2015) Source: Adapted from IPCC Special Report on Climate Change and Land, 2019. Note: Global ice-free land surface (100% = 13 billion hectares).

As the global population grows from about 8 billion in 2022 to nearly 10 billion by 2050[33], these production areas are projected to expand to fulfill growing human demands for food, feed, fiber, fuel, and shelter. According to one recent satellite-based study, cropland expanded by 102 million hectares (Mha) between 2003 and 2019[34], and expansion accelerated during that time period to reach a rate of 9 Mha per year by 2016-19. Cropland and pastureland expansion, as well as expansion of plantation forests, are leading to tropical deforestation; another satellite-based study found that just seven commodities—cattle, oil palm, soy, cocoa, rubber, coffee and plantation wood fiber—accounted for 72 Mha of tree cover loss from 2001 to 2015, with cattle pasture alone occupying 45 Mha of former forest during that period.[35] Agricultural expansion is the leading historical and current driver of biodiversity loss[36] and land-use change is responsible for at least a quarter of the carbon that humans have released to the atmosphere since 1750.[37]

Global food demand is projected to grow by 45% between 2017 and 2050[38] and global demand for wood products by a similar amount during that time.[39] Bioenergy policies to dedicate cropland and forest land for energy production threaten to further increase land use competition and reduce extent of unused natural ecosystems. And while the built environment occupied only about 1% of the world's ice-free land in 2015, urban expansion is projected to add pressure as well.

Against this backdrop of ongoing increases in demand for land for human needs, it is perhaps unsurprising that goals to end deforestation by 2020 were not met—and that achieving the Glasgow Leaders' Declaration on Forest and Land Use goal to halt and reverse forest loss and land degradation by 2030 will be extremely challenging. In order to end ecosystem conversion and provide opportunities for restoration, protect biodiversity and nature's contributions to people, and meet climate change mitigation and adaptation goals, a shift in

[33] https://population.un.org/wpp/

[34] https://www.nature.com/articles/s43016-021-00429-z

[35] https://www.wri.org/research/estimating-role-seven-commodities-agriculture-linked-deforestation-oil-palm-soy-cattle

[36] Millennium Ecosystem Assessment 2005

[37] IPCC 2019, Le Quere et al. 2016

[38] (Searchinger et al. 2021)

[39] Searchinger et al. forthcoming

the other direction is urgently necessary: peaking and then reducing the amount of land occupied by human activities.

2.7.1 Science-based rate of land occupation reduction over time

To keep global warming below 1.5°C, even while feeding and housing a growing global population, models generally agree that significant reductions in land dedicated to food and feed crops, as well as to pasture, will be necessary between now and 2050, alongside increases in extent of natural ecosystems. Several recent examples are listed in Table 1.

Table 14 - Recent studies with global land occupation reduction targets

Source	**Reduction in land dedicated to cropland (food and feed) and pastureland by 2050 (Mha)**	**Base year**	**Comment**
Griscom et al. (2017)	678 (95% uncertainty bound: 230-1,125)	2016	Estimated a total maximum reforestation potential of 678 Mha (by 2030), when taking into account biodiversity, food security, and fiber production safeguards—along with sustainable intensification of feed production and dietary shifts. (SBTN authors assume the reforestation will need to occur on liberated agricultural land.)
IPCC (2018)	500 in "sustainability" scenario (0-1,150 across multiple scenarios)	2010	The IPCC Special Report on 1.5°C of Warming found that 1.5°C pathways included decreases of up to 800 Mha of pastureland and up to 450 Mha of cropland dedicated to food and feed crops, and included increases of up to 950 Mha in forestland (Figure 2.24). The SSP1 scenarios, which are aligned with the Sustainable Development Goals, include a decrease of 200 Mha of agricultural land (cropland plus pastureland) by 2030 and a decrease of 500 Mha by 2050. These changes are generally driven by demand changes, increased production efficiency, and policy changes.
Searchinger et al. (2019)	611	2010	The *World Resources Report: Creating a Sustainable Food Future* estimated that fully reforesting 585 Mha of liberated agricultural lands by 2050, along with 26 Mha of peatland restoration, could offset global agricultural production emissions for many years and achieve a net-zero-emissions land sector, provided agricultural emissions could be greatly reduced to below 5 GtCO2e/year by 2050. This scenario also required agricultural intensification, reduction of food loss and waste, and dietary shifts. The model assumed the restored forests and peatlands were no longer used for productive purposes.
Food and Land Use Coalition (2019)	1,184	2010	The *Growing Better* report included a "Better Futures" scenario in which nearly 200 Mha of croplands and about 1 Bha of pasturelands are freed up for restoration of natural ecosystems by 2050, through a combination of productivity gains, reduced food loss and waste, dietary shifts, and supportive policies. Under this scenario, biodiversity declines also halt and begin to reverse between 2020 and 2050.
Roe et al. (2021)	~300 (cost-effective potential), ~1,000 (technical potential)	2020	Estimated potentials of afforestation and reforestation, noting that tradeoffs include competition with food production and biodiversity, depending on location and methods of implementation (e.g., natural regeneration, monoculture plantations, mixed species planting). (SBTN authors assume the afforestation/reforestation will need to occur on liberated agricultural land.)

Although the examples in Table 14 all include mitigation of climate change as a primary lens, it is clear that halting further agricultural expansion and instead allowing for restoration of some amount of agricultural lands is also necessary for curbing (and, where possible, reversing) biodiversity loss. For example, the Bonn Challenge is a global goal to restore 350 Mha of degraded and deforested landscapes by 2030, and there are several other proposals to restore hundreds of millions of hectares of land by 2030 as part of the post-2020 Global Biodiversity Framework, informed by a range of modelling studies.[40]

For the purposes of this target, SBTN aligns with the SSP1 scenario in IPCC's Special Report on 1.5°C of Warming (2018), which achieves the Sustainable Development Goals and thereby balances food security and other human needs as well as those nature and the climate. This scenario requires a 200 Mha decrease in cropland and pasture area by 2030 and a 500 Mha decrease by 2050. The 500 Mha reduction in global agricultural land occupation corresponds to 10.6% of the world's roughly 4.7 billion hectares of agricultural land as of 2020.[41]

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41 (FAOSTAT 2022).

Increase Ecological Integrity

This chapter of the SBTN Land Guidance sets out:

7. Key definitions relevant for this target
8. Information on **why** the target is needed
9. Information on **who** needs to set the target
10. Information on **what** the target looks like for different companies depending on direct operations and upstream sourcing of commodities
11. Information on **how** to set, report and communicate the target
12. A technical annex articulating the scientific basis of the target

3.1 Key definitions relevant for this target

Ecosystem: A dynamic complex of plant, animal and microorganism communities and the non-living environment interacting as a functional unit.[42]

Within this definition, the term ‘unit’ relies on the identification of a distinct function as well as a ‘dynamic’ grouping of biotic and abiotic factors. When using an ecosystem approach to conservation, the United Nations Convention on Biological Diversity (CBD) suggest an ecosystem can refer to any functioning unit, regardless of scale. Thus, the term is not necessarily synonymous with ‘biome’ or ‘ecological zone’ but is better determined by the problem that is being addressed.

Ecosystem integrity: Ecosystem integrity encompasses the full complexity of an ecosystem, including the physical, biological and functional components, together with their interactions, and measures these against a ‘natural’ (i.e., current potential) reference level .[43]

Carter et al. (2019), simplified this further to define ecosystem integrity as “the extent to which the **composition**, **structure**, and **function** of an ecosystem fall within their natural range of variation”.

- **Structure** comprises the three-dimensional aspect of ecosystems – the biotic and abiotic elements that form the heterogeneous matrix supporting the composition and functioning. Structure is dependent on habitat area, intactness, and fragmentation.
- **Composition** refers to the biotic constitution of ecosystems – the pattern of the makeup of species communities and the interactions between them. It refers to the identity and variety of life.
- **Function** describes the ecological processes and ecosystem services provided by the ecosystem.

The Ecosystem Integrity Index (EII): This index provides a simple, yet scientifically robust, way of measuring, monitoring and reporting on ecosystem integrity at any geographical scale. It is formed of three components, structure, composition, and function, and measured against a natural (current potential) baseline on a scale of 0 to 1:

- The metric for structure is derived from a total of 12 spatial layers of features associated with anthropogenic pressure on biodiversity, including population density, built-up areas, agriculture, roads, railroads, mining, oil wells, wind turbines and electrical infrastructure.
- The metric for composition is a combination of the assessment of the impact of human pressures on the total abundance of species within a community and the

[42] https://www.cbd.int/ecosystem/description.shtml
[43] https://link.springer.com/article/10.1007/s00267-019-01163-w

assessment of the similarity between the relative abundance of each of the species in a community in a non-natural landscape with those in a natural landscape.
- The metric for function is estimated using the difference between potential natural and current net primary productivity (NPP) within each 1km grid cell.

The index has been developed to help national governments measure and report on various of the goals and targets being developed within the draft post-2020 Global Biodiversity Framework being negotiated under the Convention on Biological Diversity, and for non-state actor contributions to also be recognized.

Landscape: For the purpose of this guidance, the landscape is the area where a landscape approach is being implemented. In ideal cases the landscape will have been defined through a broad stakeholder led process into which a company may begin its participation. This may not always be the case for areas that are relevant for companies. In these cases, a more prescriptive approach to landscape identification may be required. Here it may be possible to utilize water basin boundaries identified through the SBTN Freshwater target methodology or through SBTN's Step 2 prioritization process.

Landscape approaches: Collaboration of stakeholders within a defined natural or social geography, such as watershed, biome or company sourcing area. These approaches seek to reconcile competing social, economic and environmental goals through "integrated landscape management" – a multi-stakeholder approach that builds consensus across different sectors with or without government entities[44]. (TFA, WWF, Proforest 2020).

3.2 Why is the target needed?

Around 2/3rds of the world's habitable land is under some form of management by humans (i.e., "working lands"):

- Almost half of the world's habitable land is used of agriculture (4.8 billion hectares).
- Around 30% of the world's forests is managed primarily for the production of wood and non-wood forest products (1.15 billion hectares), while a further ~20% is designated for multiple use, which often includes production (749 million hectares).
- 1% of habitable land comprises urban areas and infrastructure (150 million ha).

Adoption of Land targets on conversion and land occupation will drive a reduction of the existing and expanding footprint of working land of SBTN companies which are required to set these targets, protecting the natural ecosystems which exist today and freeing up land for restoration to deliver outcomes for climate, nature and people.

The third SBTN Land target works to drive nature outcomes on the land which will remain as working land – the land which we depend upon to grow food, to harvest timber, for livelihoods and where we live. These working lands are where companies can have significant impact on nature through shifting towards more sustainable management practices. Companies also rely upon the functioning of these working lands in terms of provision of ecosystem services. For example, dramatic decline in insect populations – dubbed the "insect apocalypse" - puts at risk the US$235 - 577 billion of crop production that depends on animal pollination.[45] Loss of biodiversity on farm reduces resilience to shocks, increasing the likelihood of "tail end" risks such as concurrent crop failures in several of the world's main food-producing regions.[46]

[44] https://jaresourcehub.org/wp-content/uploads/2020/09/JA-Practical-Guide.pdf
[45] OECD. 2019. Biodiversity: Finance and the Economic and Business Case for Action. Prepared by the OECD for the French G7 Presidency and the G7 Environment Ministers' Meeting.
[46] https://www.fao.org/3/CA3129EN/CA3129EN.pdf

This target will ensure that Land SBTs can address the physical arrangement of natural ecosystems in landscapes, the intensity of lands uses within such areas, and the ecological function that these areas provide.

Considering the SBTN ARRRT action framework, this target will provide companies with guidance and requirements that incentivize a full range of corporate responses, including regenerative, restorative, and transformative practices. The actions incentivized will ensure that companies will deliver nature-positive outcomes.

3.3 Who needs to set the target?

Companies are *required* to set an ecological integrity target if:

A. It is identified during SBTN's Step 1 (Assess) that land-associated pressures are material;

AND

B. Table 4 of this document (page 13) indicates that an ecosystem integrity target is required for select sectors based on their International Standard Industrial Classification of All Economic Activities (ISIC) designated sector(s) . As per Table 4, all sectors listed with the exception of manufacture of machinery and equipment and "other sectors" are required to set ecosystem integrity targets.

The decision-tree below visualizes these requirements and guides companies in understanding their target setting requirements as it relates to ecological integrity targets.

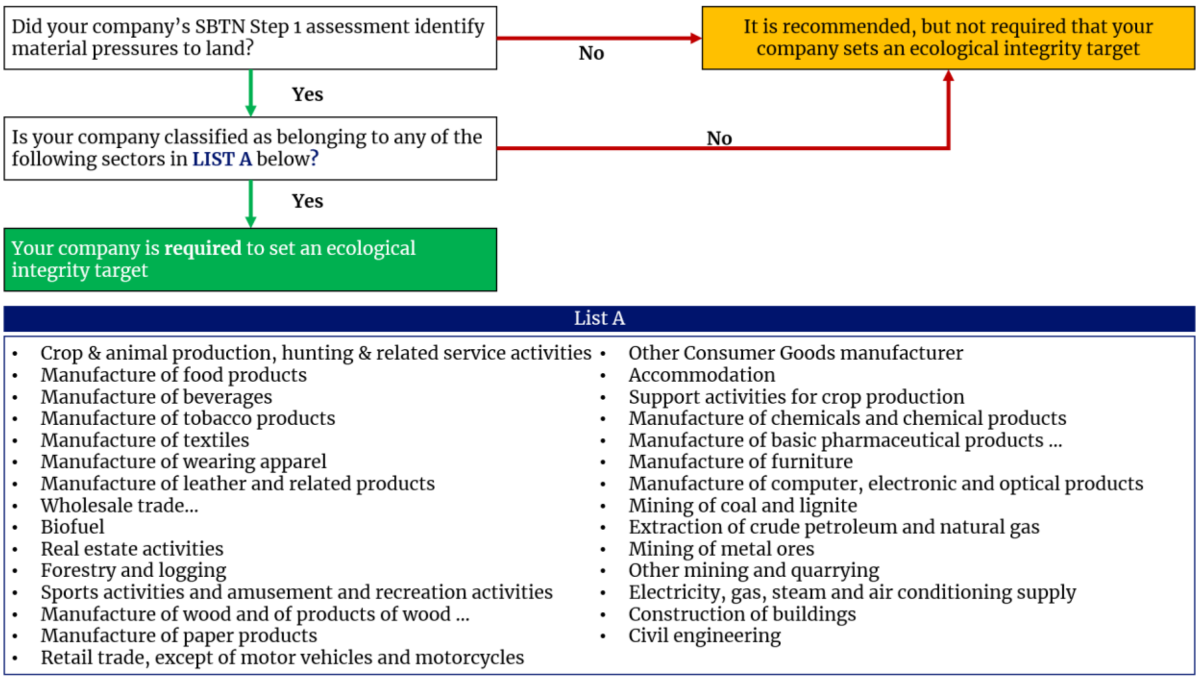

Figure 11 - Decision-tree for setting an ecological integrity target

3.4 What is the target?

The target is based on an increase in Ecological Integrity Index (EII) scores (see definition above) within a company's direct operations and supply chains, with a special focus on priority landscapes for production and sourcing of high impact commodities.

Companies *must* calculate the EII score for land they own, manage, or control (see definitions of ownership and control in Step 1) and for priority landscapes (see Step 2). Following the guidance provided in the next section a company *must* develop and submit an EII **action plan** to SBTN that outlines how the implementation of the target requirements and actions needed to increase the EII score on land they own, manage or control and in priority landscapes will proceed.

3.5 How will companies set this target?

3.5.1 Data requirements for target setting

To set a target to increase the integrity of ecosystems, companies *will* collect data on:

1) Location and area of holdings pertaining to high impact commodities and locations prioritised in Step 2 (see Annex 1 and Annex 3)
2) Land use and intensity data for each location (preferred) or origin and volumes at the production unit level or sourcing area level.

Data requirements vary according to the stages of the value chains where a company operates.

Table 15 – Minimum data requirements for setting an incremental target on increasing ecosystem integrity

Stage of the value chain	Data Requirement	Unit of Measurement
Example: Producers of agricultural commodities Producers of forestry products Mining companies Infrastructure and construction companies	Locations of all sites (to ecosystem level) prioritised in step 2. Land use and intensity data for each location (preferred) or origin and volumes at the production unit level or sourcing area level	Production Unit [Hectares] Mining sites [Hectares] Project sites [Hectares] Land use and land use intensity
Upstream Activities (Supply chain)	Production Unit or Sourcing Area of high impact commodities purchased	Production Unit or Sourcing Area [Hectares]
	Volumes of high-risk land-intensive commodities purchased from each production unit or sourcing area.	[metric tonnes or equivalent]
Upstream Activities (Supply Chain)	Preferred Production Unit or Sourcing Area of high-risk, land-intensive commodities embedded into complex products purchased	Production Unit or Sourcing Area [Hectares]
	Required Volumes of high-risk land-intensive commodities embedded into complex products purchased	[metric tonnes or equivalent]

Data needs for direct operations

We expect that for direct operations a company will have spatially precise asset-level data. This is advantageous, as a company can manipulate the EII framework, incorporating their own data, to achieve an accurate and robust assessment of their current impact and how potential actions may mitigate impacts within specific localities. Data must be geolocated, pixel or polygon-based, with metadata describing land use and management intensity, ideally at a ***resolution of 1km or below***. An understanding of how assets or actions would affect each of the three components would enhance the quality and accuracy of any modelling of impacts. By pinpointing grid cells, companies can interact with the layer and consider what pressures that are specifically associated with that component, can be modified.

With this information, the three individual components of the Ecosystem Integrity Index (structure, composition, or function) can be directly manipulated to reflect any relevant actions a company may take and to show separate responses for composition, structure and function, as well as an overall response for the aggregated index. This will provide companies with guidance on which aspect of ecosystem integrity to focus efforts to achieve the greatest improvement in their EII score.

Another advantage of spatially-explicit data is that an assessment can be made of how natural the area in question is. This information can help to determine what actions will be most beneficial. For example, if an area is natural, it is likely that an avoid or restore course of actions would produce the greatest effect for ecological integrity. In natural working lands, non-natural areas or degraded ecosystems a change in management practices could produce significant results for a company's progress on an ecological integrity target.

Where a company does not have spatially precise asset-level data, then a statistical data approach can be undertaken; however, spatial precision to a regional level is required. Guidance on this approach is forthcoming.

Traceability to production unit

When companies can trace the sourcing of high impact commodities to production unit, then they can demand producers or project site operators to provide spatial data. Companies can therefore follow the approach defined for direct operations.

Traceability to sourcing area: [forthcoming]

Unknown origin [forthcoming]

CONSULTATION QUESTION:

Should SBTN Land recommend that all locations and commodities identified in Step 2 are screened using the ecosystem integrity methodology?

Should companies be given additional guidance on how to prioritize locations based on a set of criteria e.g.

- Prioritize existing landscape with active landscape initiatives (SBTN might therefore need to provide a list of landscapes with active initiatives for this to be possible)
- Prioritize sourcing areas for which higher level of data and traceability is available
- Prioritize landscapes where other committed actors are present

3.5.2 Practical steps for setting an EII-based target

Notes for reviewers

Target setting applied to all assets identified within step 2 prioritisation

Assets and holding are used to identify production units and project sites

Direct operations

1. Setting ecosystem boundaries. The EII target will apply to each ecosystem within which production units and project sites are located. The first step will be to identify the ecosystem within which assets are located. An ecosystem boundary would need to be drawn and data on the spatial location of holdings within this area would need to be provided.

Ecosystems are hard to map and delimit. They are comprised of biotic and abiotic elements which vary along a gradient of composition and include the interactions between these elements, which also vary across time and space. Furthermore, all ecosystems are connected and mutually reliant. Most ecosystem approaches define an area smaller than an ecoregion, or nested within ecoregions. There are several approaches to producing global maps of ecosystems. For the purposes of SBTN, two methods have been selected:

1) the IUCN Global Ecosystem Typology (GET). This is a hierarchical classification system with six tiers of ecosystem each with an increasing level of subdivision. In the upper tiers, ecosystems are distinguished by their convergent ecological functions. At lower levels, these categories are refined further based on the contrasting assemblages of species engaged in those functions. (Keith et al., 2020).

2) the World Ecosystems layer. The World Ecosystems is a global layer of terrestrial ecosystems proposed in Sayre et al. (2020), aiming to improve upon the Intergovernmental Panel on Climate Change (IPCC) Climate Zones (IPCC, 2006) and Food and Agriculture Organisation's Global Ecological Zones (FAO, 2001a, 2001b). The World Ecosystems are based on mean annual temperature, the Aridity Index, landform and vegetation type.

2. Incorporating company data. Land use data (and any other relevant pressure data the company has available, see table X for pressures that can be included within an EII baseline calculation) will be incorporated into the EII baseline data to calculate the company-specific baseline values for each asset. An understanding of the resolution at which company data is produced in relation to the scale of the EII layer ($1km^2$) is required. Where asset polygons occur across part of a 1km pixel, EII will be weighted proportional to the coverage of the grid cell. To calculate extent of holdings, the number of grid cells will be summed, including those that are only partly covered by asset polygons. In these cases, the proportion covered will be added to the extent calculations.

3. Calculation of EII. The mean EII across all holdings within each ecosystem is calculated as well as the distance between a natural level of EII (0.7) and the mean EII.

4. Calculation of target. The ecosystem integrity target is calculated as 5% of the difference between the mean EII of all holdings within an ecosystem and 0.7. The final step is to consider the appropriate management changes across holdings to result in the targeted increase in mean EII by 2030.

> A company with a mean EII across holdings of 0.15 would subtract this from the desired threshold of 0.7, giving them a deficit in EII of 0.55. A five percent increase equates to an increment of 0.0275 EII, increase the mean to 0.1775 across holdings. We would expect that this increase would be spread relatively evenly across the grid cells over which holdings operate. This avoids the concentration of efforts in just one region as a means of raising EII across all holdings.
>
> Only holdings with a mean EII of 0.7 or below are included in baseline calculations within a designated area. This means that companies would not be able to simply purchase areas of natural habitat as a way of raising EII. It promotes interventions that would actively illicit a change in EII such as change in management practices. If a company undertakes actions to increase the EII of a certain holding above the threshold of 0.7, this asset will remain within EII calculations. This means that progress can be tracked effectively, and the boundary remains constant for all assessments.

3.5.3 Target setting at the landscape scale

In addition to setting SBTs for land across all high-impact company production units or project sites in no conversion and reduction in land occupation, it is necessary to set targets for ecosystem integrity at a landscape scale. It is important to understand values of and requirements for ecosystem integrity at this scale and ensure that companies consider the needs of local communities when they undertake actions.

Target setting across a company's holdings within an ecosystem allows the company freedom to allocate responses where they choose. This may result in the selection, for instance, of areas for restoration where the company will most benefit from the increase in ecosystem service provision. Multi-stakeholder approaches at the landscape level ensure that the social, economic, and cultural needs of local communities are taken into account when defining which actions should be implemented for achieving environmental goals.

Besides, corporate actions can be amplified and become more effective when implemented collectively and at a wider scale, as showed in the increasingly growing number of active landscape initiatives (TFA, WWF, Proforest 2020).

To apply the EII target at the landscape level, companies must have identified two initial priority landscapes following SBTN's Step 2: Prioritize guidance.

Once landscapes have been selected, stakeholder consultation must be undertaken to assess the needs of the local community, where actions will have the most benefit, and who should be held responsible for undertaking the actions. Information that should be considered includes:

- mean EII across the landscape,
- counterfactual assessment of a company's impacts on EII within that landscape,

- baseline levels of NCP across the landscape and contributions of NCPs at different scales (local to global),
- an understanding of the contributions of other actors in the landscape,
- the needs and values of local communities.

This step will result in a negotiated written agreement at the landscape level as to how ecosystem integrity will be enhanced, what actions will be undertaken by whom, and the appropriate timescales.

Target setting in supply chains

[Note to reviewers: the applicability of this target setting methodology for companies sourcing high-impact commodities is still in progress and will be included in the version of this guidance that will be made available for public consultation in January 2023.]

3.6 Target validation

Requirements differ for each of the three approaches to target setting:

Direct operations (production units and project sites)

1. Provide verification of land use data and any other pressure data provided by the company for use in the calculations. This would include information on sourcing of data and validation against other remotely sensed land use or pressure layers.
2. Provide evidence documenting how ecosystem boundaries have been drawn
3. Show calculations of mean EII across holdings
4. Show calculations of target based on a 5% increase in the difference between the mean EII and threshold value for natural areas of 0.7.

Direct operations (landscape approach)

1. Proof of stakeholder consultation and that all relevant parties have been involved within this process
2. Show that an adequate assessment of needs of local communities has taken place
3. Proof that community needs have been considered and met by any action taken
4. Written agreement between all relevant stakeholders on actions to be taken.

Supply-chain operations

[Forthcoming]

3.7 Upcoming tool for EII calculation

The tool will be designed to facilitate use and application of EII by companies, to track the impacts of their direct and supply chain operations on the environment. The tool will allow companies to input their own asset-level data and to determine the baseline EII of their production units and project sites. They will be able to calculate the difference between the mean EII of their production unites and project sites and the EII threshold of naturalness, to derive the 5% target increase required. The tool would also allow them to assess EII within the wider landscape, enabling them to prioritise areas as well as identify opportunities for restoration.

Currently the tool takes the form of a series of scripts in both Google Earth Engine and R software. These allow the user to manipulate each of the three component layers of EII separately to reflect changes in land use. The ambition for this tool is to provide an online platform for companies to enter their data and calculate their EII scores and targets, without having to use scripts. This tool will likely be completed in 2024

3.8 Reporting requirements

On annual basis, companies which have set an EII target will be required to disclose information on the actions and investments directed to increase ecosystem integrity.

In the absence of an annual recalculation of the EII values, the progress of companies will be assessed through the attached reporting framework (in development within the Consumer Goods Forum – Forest Positive Coalition with the support of Proforest, TFA, and other partners).

[Note to reviewers: the Land Hub will work with Proforest and partners to assess how the metrics of the Landscape Reporting Framework can be used as proxies for measuring progress of companies to improve ecosystem integrity.

CGF-FPC_Landscape
%20Reporting%20Fra

II. Glossary of terms and acronyms

[to be completed before public review. Kindly add as you see fit

III. References

We will format these properly for public consultation – for the moment they're included as end notes.

IV. ANNEXES

ANNEX 1: Land intensive commodity list

Table 16 – "A commodities" – Land conversion driving commodities that are relevant globally and across biomes

Soft Commodities	Source
Cattle Pasture (Beef/ Dairy/ Leather)	Multiple Sources
Cocoa	Multiple Sources
Coffee	Hoang, 2021[47]
Maize	Multiple Sources
Oil Palm	Multiple Sources
Rice	Multiple Sources
Rubber	Multiple Sources
Sorghum	Phalan, 2013[48]
Soybeans	Multiple Sources
Sugarcane	Phalan, 2013[49], Dryad, 2020[50]
Timber/Wood Fiber	Multiple Sources
Wheat	Multiple Sources
Activities/Applications	**Source**
Biofuels (Ethanol, Solid Biomass, etc.)	Multiple Sources
Feed for Animal Protein - Cattle, Pork, Chicken, Aquaculture, etc.	Multiple Sources

Table 17 – "B commodities" – land conversion driving commodities that are relevant to a particular region or biome

Soft Commodities	Source
Avocados	Dryad, 2020[51]

[47] Hoang, Nguyen Tien and Kanemoto, Keiichiro. 'Mapping the deforestation footprint of nations reveals growing threat to tropical forests,' Nature Ecology & Evolution, VOL 5, June 2021, 845-853.
[48] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759
[49] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759
[50] Quantis, Dryad model for deforestation based on FAO production and crop expansion data. Accessed 2020 as part of project for WWF contract identifying the deforestation driving commodities for Project Gigaton.
[51] Quantis, Dryad model for deforestation based on FAO production and crop expansion data. Accessed 2020 as part of project for WWF contract identifying the deforestation driving commodities for Project Gigaton.

Banana	Meyfroidt,2014[52], Jayathilake, 2021[53]
Beans	Phalan, 2013[54]
Buckwheat	Plowprint, 2022[55]
Camelina	Plowprint, 2022[56]
Canola	Plowprint, 2022[57]
Cassava	Phalan, 2013[58], Jayathilake, 2021[59]
Charcoal, Commercial	Jayathilake, 2021[60]
Coconut	Dryad, 2020[61], Jayathilake, 2021[62]
Cotton	Dryad, 2020[63]
Cowpeas	Phalan, 2013[64]
Grapes	Plowprint, 2022[65]
Groundnut	Phalan, 2013[66]
Millet	Phalan, 2013[67]

[52] Meyfroidt, Patrick, et al. 'Multiple pathways of commodity crop expansion in tropical forest landscapes,' Environmental Research Letter, 9 (2014) 074012 (13pp).

[53] Jayathilake, H. Manjari, et al. 'Drivers of deforestation and degradation for 28 tropical conservation landscapes,' Royal Swedish Academy of Science. Ambio 2021, 50:215-228.

[54] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759

[55] WWF, 2022 PlowPrint Report, 2022

[56] WWF, 2022 PlowPrint Report, 2022

[57] WWF, 2022 PlowPrint Report, 2022

[58] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759

[59] Jayathilake, H. Manjari, et al. 'Drivers of deforestation and degradation for 28 tropical conservation landscapes,' Royal Swedish Academy of Science. Ambio 2021, 50:215-228.

[60] Jayathilake, H. Manjari, et al. 'Drivers of deforestation and degradation for 28 tropical conservation landscapes,' Royal Swedish Academy of Science. Ambio 2021, 50:215-228.

[61] Quantis, Dryad model for deforestation based on FAO production and crop expansion data. Accessed 2020 as part of project for WWF contract identifying the deforestation driving commodities for Project Gigaton.

[62] Jayathilake, H. Manjari, et al. 'Drivers of deforestation and degradation for 28 tropical conservation landscapes,' Royal Swedish Academy of Science. Ambio 2021, 50:215-228.

[63] Quantis, Dryad model for deforestation based on FAO production and crop expansion data. Accessed 2020 as part of project for WWF contract identifying the deforestation driving commodities for Project Gigaton.

[64] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759

[65] WWF, 2022 PlowPrint Report, 2022

[66] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759

[67] Phalan B, Bertzky M, Butchart SHM, Donald PF, Scharlemann JPW, et al. (2013) Crop Expansion and Conservation Priorities in Tropical Countries. PLoS ONE 8(1): e51759. doi:10.1371/journal.pone.0051759

Mustard	Plowprint, 2022[68]
Onions	Plowprint, 2022[69]
Pineapple	Meyfroidt, 2014[70]
Potato	Plowprint, 2022[71]
Radishes	Plowprint, 2022[72]
Rye	Plowprint, 2022[73]
Safflower	Plowprint, 2022[74]
Speltz	Plowprint, 2022[75]
Sugar Beets	Plowprint, 2022[76], Dryad[77]
Triticale	Plowprint, 2022[78]
Vetch	Plowprint, 2022[79]
Hard Commodities	**Source**
Bauxite	Luckeneder, 2021[80]
Coal, Surface Mining	Yu[81]
Copper	Luckeneder, 2021[82]
Gold	Luckeneder, 2021[83]
Iron	Luckeneder, 2021[84]

[68] WWF, 2022 PlowPrint Report, 2022
[69] WWF, 2022 PlowPrint Report, 2022
[70] Meyfroidt, Patrick, et al. 'Multiple pathways of commodity crop expansion in tropical forest landscapes,' Environmental Research Letter, 9 (2014) 074012 (13pp).
[71] WWF, 2022 PlowPrint Report, 2022
[72] WWF, 2022 PlowPrint Report, 2022
[73] WWF, 2022 PlowPrint Report, 2022
[74] WWF, 2022 PlowPrint Report, 2022
[75] WWF, 2022 PlowPrint Report, 2022
[76] WWF, 2022 PlowPrint Report, 2022
[77] Quantis, Dryad model for deforestation based on FAO production and crop expansion data. Accessed 2020 as part of project for WWF contract identifying the deforestation driving commodities for Project Gigaton.
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Lead	Luckeneder, 2021[85]
Manganese	Luckeneder, 2021[86]
Nickel	Luckeneder, 2021[87]
Palladium	SBTN HICL, 2022[88]
Platinum	SBTN HICL, 2022[89]
Silver	Luckeneder, 2021[90]
Zinc	Luckeneder, 2021[91]
Activities/Applications	**Source**
Urban/Settlement & Infrastructure Development	Jayathilake, 2021[92]
Hydroelectric Dam Development	WWF, Deforestation Fronts[93]
Oil & Gas Exploration	Jayathilake, 2021[94]

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[94] Jayathilake, H. Manjari, et al. 'Drivers of deforestation and degradation for 28 tropical conservation landscapes,' Royal Swedish Academy of Science. Ambio 2021, 50:215-228.

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ANNEX 2: Accounting for land use change at the level of the production unit

Monitoring land use change at the level of production units (e.g. farms, plantations, and forest management units) or project sites (e.g., mining sites, construction sites) provides the greatest amount of precision about the impact in company operations and supply chains and is the best way to determine whether products or sites are linked to recent deforestation or conversion. Accounting for land use change at this level requires known and mapped locations of the given production units, demarcated by geo-referenced boundaries. The role of any given company in monitoring and accounting for land use change at the site level may differ depending on its position(s) in the supply chain. Upstream supply chain actors (i.e., producers, primary processors, and traders with visibility to the production unit) are in the position to monitor on-the-ground conditions. They should directly monitor and document land use change and furnish downstream buyers with information about land use change associated with the products being sold. Downstream companies that purchase commodities or derived products may assess recent deforestation and conversion at the site level by gathering data collected by their suppliers, monitoring known production sites directly using spatially explicit remote sensing data, or using third party certification schemes with chain of custody models that provide traceability to origin.

Companies should apply the following steps to account for land use change and associated emissions at the scale of the production unit:

1. Identify the spatial boundaries of production units owned or managed by the company or known to produce materials in a company's supply chain.

2. Identify land use change events that occurred within the spatial boundary since the cutoff date and during the emissions assessment period (see Section 2.3). • Deforestation and conversion identified since the cut-off date should be reported through appropriate indicators (see Section 5). • If there has been no deforestation or conversion on a production unit since the cut-off date, then product volumes from that production unit may be considered deforestation/ conversion free (see Section 4.6).

Accounting for land use change at an area level

As described in Section 4.1, it is sometimes not possible or appropriate to assess conversion of natural ecosystems at the scale of specific production units in a company's supply chain. In these cases, both supply chain deforestation/conversion and scope 3 land use change emissions may be accounted for at the scale of a sourcing area in which production units are located. Depending on the location, production context, and commodity, a sourcing area may be the supply-shed of a processing facility (such as a radius surrounding a palm oil mill), a production landscape (such as the area encompassing a smallholder cooperative), or a subnational jurisdiction. When sourcing areas are not known, LUC emissions may be estimated at national or global scales. Assessments at an area level serve as a proxy for direct land use change, and emissions accounting uses statistical land use change (Sluc) methods. By providing an estimate of land use change potentially allocated to a given product, Sluc inherently also considers some amount of indirect land use change – that is, pressure by expansion of one commodity that may lead to LUC for another commodity (see Section 4.5).

When land use change may be assessed at the level of a sourcing area

Accounting for deforestation and conversion associated with agricultural and forest commodities at the scale of a sourcing area may be appropriate in a range of circumstances, including when: • Downstream companies do not have physical traceability to the production unit level and may therefore need to monitor land use change at the sourcing area level as the best available option. In this case, the sourcing area should be the smallest geographic area from which commodity volume is known to originate, and companies should also take steps to increase traceability of these volumes. • A sourcing area is the most relevant scale for managing deforestation and conversion risk, for example where: • Upstream companies such as primary processors source commodity volumes from a specified radius or sourceshed around their facilities without maintaining long-term buying relationships with specific producers. • Companies source from smallholder producers whose materials are aggregated at the level of a co-op or collection point and where further traceability is not possible. • Companies source from jurisdictions or landscapes where it can be shown that there has been no or negligible recent conversion. In these cases, companies may find it cost-effective to monitor deforestation/conversion at the level of such areas. Doing so requires regular monitoring to assess or confirm the risk status of these jurisdictions and identify any changes in risk status.

Methods to allocate land use change in a sourcing area to commodity volumes (Afi Guidance)

There are many approaches to allocating area-level data on land use change to commodity volumes sourced from that area, and improved data and methodologies are rapidly being developed. All such methods utilize remote sensing data repeated over the relevant time frames as well as statistics about agricultural production and land use in the area. Land use change included in the allocation process It is recommended that, when allocating land use change at an area level to specific commodity volumes, all land use change that may be related to agriculture (for crop or livestock products) or forestry (for forest products) is included in the analysis. Consideration of all agriculture- or forestry related land use change allows companies and others to best account for varied land use change trajectories or indirect land use change pressures, providing an appropriately conservative approach to allocation. Time frame of land use change included in the allocation process When accounting for LUC emissions, the 20-year or longer assessment period should be used to calculate land use change to be allocated. When accounting for deforestation and conversion, the cut-off date should be used to calculate the land use change to be allocated. When a sectoral or commitment cut-off date does not exist, a fixed reference date should be specified that is not later than 2020 and is recommended to be at least five years previous to the reporting year. Possible allocation approaches The GHG Protocol provides two recommended approaches for allocating land use change in a given area: 1. 2. Allocation based on land occupation allocation based on commodity expansion Table 2 provides descriptions of these two approaches, and Chapters 7 and 17 of the draft GHG Protocol Land Sector and Removals Guidance for additional detail on applying allocation methods to LUC emissions.

Table 18 – approaches to allocation of land use change at the level of a sourcing area

<table>
<tr><th>Basis for allocation</th><th>Method</th><th>Data needs specific to allocation approach</th><th>Data needs common to both allocation approaches</th></tr>
<tr><td>Relative land occupation
Called 'shared responsibility approach' by GHG Protocol</td><td>Allocate recent land use change across products based on the relative land area occupied by each product</td><td>Total land area in agriculture and/or forestry in sourcing area
Amount of land area in production for commodity of interest in sourcing area</td><td rowspan="2">Area of LUC in sourcing area
• deforestation/conversion associated with agriculture and/or forestry since cutoff date
• associated LUC emissions for each year of assessment period
Quantity of commodity of interest produced in the area
Quantity of commodity of interest sourced by the company from the area</td></tr>
<tr><td>Relative product expansion
Called 'product expansion approach' by GHG Protocol</td><td>Allocate recent land use change across products based on the relative area of expansion for each product</td><td>Total area of expansion of agriculture and/or forestry production since cutoff date and in each year of the assessment period
Expansion of production area of commodity of interest since cutoff date and in each year of the assessment period</td></tr>
</table>

Other allocation methods may be used if they meet the above criterion of considering all agricultural or forestry related land use change in the sourcing area. Especially when commodities are a relatively small component of land use in an area, other more context-specific approaches may be warranted. Allocation approaches based on product-specific conversion – those which only consider land use change on land currently used for the production of a given commodity – may not effectively account for land use change trajectories in a sourcing area and therefore may not be credible. Such methods may be assessed through the piloting process of the GHG Protocol Land Sector and Removals Guidance, and determination of whether this approach (called 'spatially explicit Sluc approaches' by the GHG Protocol) will be acceptable for LUC emissions accounting will be made following that period. In all cases, the method and data sources used to allocate land use change and associated emissions to products within a sourcing area should be clearly disclosed.

Steps for land use change accounting at the level of a sourcing area

Companies should apply the following steps to account for land use change and associated emissions at the level of a sourcing area.

1. Select an appropriate spatial boundary based on physical traceability of the product to a given area, f**or example a sourcing region or subnational jurisdiction.**
2. Use suitable data products to identify all areas within the spatial boundary where land use ch**anged from a forest or other natural ecosystem to agriculture or plantation forestry since the cutoff date (for deforestation/conversion accounting) and within the assessment period (for LUC emissions accounting).**
3. Allocate deforestation and conversion iden**tified since the cutoff date to product volumes, using one of the approaches identified in Table 2 or a similar credible method.**
    - Deforestation/conversion footprint should be reported through appropriate indicators (see Section X), along with information on allocation methods and data sources.

- If no land use change is identified within a given sourcing area, then volumes sourced from that area may be considered deforestation/conversion free (see Section 4.6).

Comparison with cut-off dates for Land Use Change (LUC) emissions accounting

LUC emissions accounting and target setting (guided by the GHG Protocol and SBTi FLAG, respectively) requires companies to measure LUC and corresponding emissions based on a retrospective assessment period of 20 years or longer, starting from the reporting year and looking back in time.

If products have a crop cycle or rotation period greater than 20 years, then the assessment period should be at least as long as the crop rotation period. The length of the assessment period reflects the average time that it takes for soil carbon stocks to reach a new equilibrium following land use or conversion and in consideration of diverse land use change trajectories.

The GHG Protocol and SBti FLAG guidance allows for flexibility in the approach used to allocate the total LUC emissions over the assessment period. Specifically, companies may choose to apply either linear discounting or equal discounting over time. See Chapter 7 of the GHG Protocol Land Sector and Removals Guidance for more detail.

The longer timeframe included in LUC emissions for GHG accounting is based on how long emissions from ecosystem conversion remain in the global emissions budget. However, this calculation does not provide guidance on when that land conversion should stop, only the length of time that emissions must be reflected in the GHG inventory. The 2020 cut-off for SBTN Land’s no conversion target acts independently of this GHG accounting guidance and provides a cut-off date for conversion of natural ecosystems aligned with the (draft) Post 2020 Global Biodiversity Framework.

ANNEX 3: Technical guidance for consulting the natural ecosystems map

How to use the map to calculate conversion of natural ecosystems after 2020

This section provides guidance on how a company can consult the map to calculate conversion of natural ecosystems based on direct measurements or statistical calculation of conversion. There are different prerequisites and associated pathways for companies at different stages of supply chains.

[Note to reviewers: Where the map will be hosted is yet unclear. Once the online "home" of the map will be selected, an in-depth guide on how to use the software/platform to consult the map will be included as a technical annex]

Producers and project site owners and operators

Producers and project site owners/operators are required to collect data (as per section [x]) on their production units and recent conversion occurring after the 2020 baseline year.

With the data collected, companies can overlap the spatial data displaying recent conversion with the map. The map will allow a company to identify whether the conversion that occurred is of natural ecosystems or other non-natural land.

The conversion of natural ecosystems caused that has occurred must be disclosed to SBTN or transparently reported via CDP Forests or following GRI requirements.

All conversion of natural ecosystems that happened after 2020 must be remediated based on the remediation guidance of Afi 2020 and the [Group 1] considerations outlined in this guidance (forthcoming).

Direct sourcing

Companies who are directly sourcing commodities and products driving conversion are required to collect data (as per section [x]) on production units or sourcing areas. When accounting directly for conversion through production unit's spatial data, companies can consult the map following the same procedure used by producers.

Companies using data on sourcing areas must follow the accounting guidance for estimating the area converted using statistical land use change methods.

For a given sourcing area, data on conversion must be retrieved. All conversion must be assessed through the map for understanding the hectares of natural ecosystems converted. Allocation methods presented in the accounting guidance must be used to allocate responsibility of conversion to a given company.

Indirect sourcing

Companies who are indirectly sourcing commodities or products driving conversion are required to collect data (as per section [x]). For volumes traceable to production unit, companies can consult the map using the same procedure defined for producers. For volumes traceable to sourcing areas, companies can consult the map following the same procedure used by producers.

For volumes that are not yet traceable and/or highly transformed, companies cannot use the map to assess and quantify conversion of natural ecosystems. In this case, companies are asked to collect data on the volumes purchased of all commodities and products containing them and disclose them following the reporting requirements (section X).

ANNEX 4: Scientific insights on conversion of natural ecosystems and the contribution of a no conversion target to other environmental goals

Conversion is defined[95] as a change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.

Humans have converted between a third and a half of habitable land for crop and livestock production. Globally, agriculture and forestry are the primary drivers of ecosystem conversion. 90% of recent deforestation across the tropics has been driven by agriculture[96]. The majority of this conversion is caused by seven commodities: cattle, palm oil, soy, cocoa, rubber, coffee and plantation wood fibre, with cattle having by far the largest impact.

Cattle pasture has replaced 45.1 million hectares of forest[97], and also has lead to the destruction of woodlands, savannahs, and grasslands in South American and elsewhere. Many natural grasslands around the world are used for livestock grazing. As global demand for meat products increases, this will drive both conversion of natural grasslands into planted pastures as well as the conversion of other ecosystems for both pasture and feed.

Oil palm has replaced 10.5 million hectares from 2001 to 2015, with soy replacing 7.9 million hectares. Cocoa, rubber, coffee, and wood fibre have led to the conversion of around 2 million hectares of forest each over that time[98] Other commodities are responsible for pressure on specific natural ecosystems, for example rice and shrimp production are primary drivers of conversion of mangroves, which are being lost at a similar rate to that of tropical forests. [99,100,101,102,103,104]

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[95] https://accountability-framework.org/wp-content/uploads/2022/09/AFI-LUC-and-Emissions-Guidance-09_2022.pdf

[96] Pendrill, F., Gardner, T. A., Meyfroidt, P., Persson, U. M., Adams, J., Azevedo, T., ... & West, C. (2022). Disentangling the numbers behind agriculture-driven tropical deforestation. Science, 377(6611), eabm9267.

[97] https://www.globalforestwatch.org/topics/commodities/#intro

[98] https://deforestation-free.panda.org/wp-content/uploads/2021/07/WWF-Deforestation-2021.pdf

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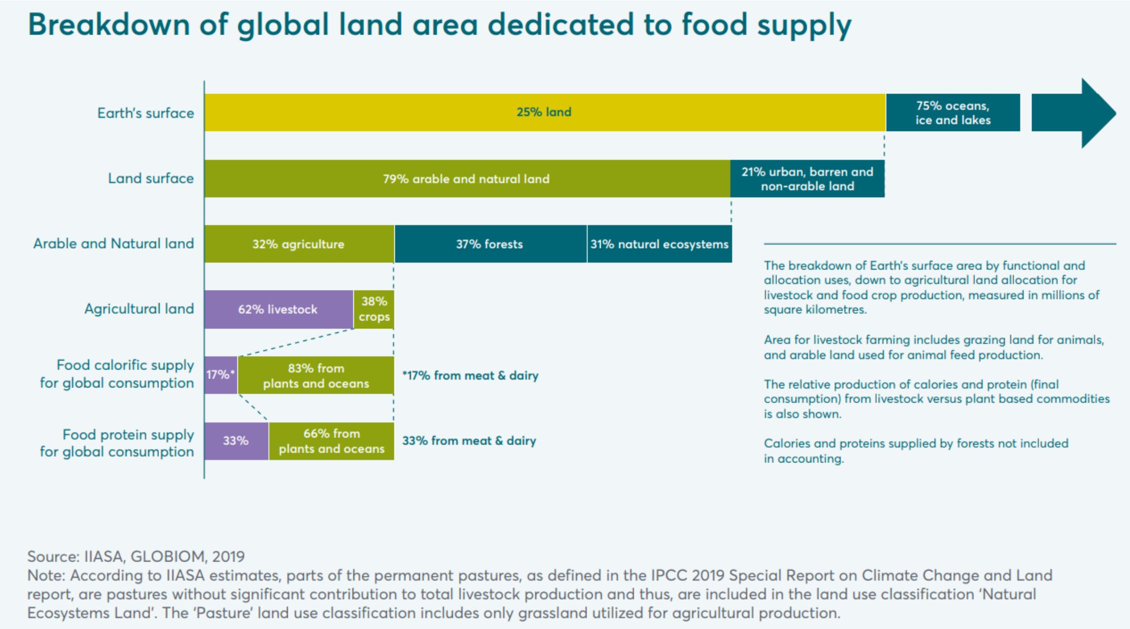
[103] https://www.globalforestwatch.org/blog/commodities/global-deforestation-agricultural-commodities/

[104] Hosonuma, N., Herold, M., De Sy, V., De Fries, R. S., Brockhaus, M., Verchot, L., ... & Romijn, E. (2012). An assessment of deforestation and forest degradation drivers in developing countries. Environmental Research Letters, 7(4), 044009.

Figure 11 – Global land area dedicated to food supply



Note to figure 6: Cropland includes all land in food, feed, and fodder crops, as well as other arable land (cultivated area). This category includes first generation non-forest bioenergy crops (e.g., corn for ethanol, sugar cane for ethanol, soybeans for biodiesel), but excludes second generation bioenergy crops. Pasture includes categories of pasture land, not only high-quality rangeland, and is based on FAO definition of 'permanent meadows and pastures'. Bioenergy cropland includes land dedicated to second generation energy crops (e.g., switchgrass, miscanthus, fast-growing wood species). Forest includes managed and unmanaged forest. Natural land includes other grassland, savannah, and shrubland. Source: IPCC, 2022[105]

Table 19 – Amount of conversion of the world ecosystems

Vegetation/Land Cover	Current (actual) Area (thousand ha)	Converted (potential) Area (thousand ha)	Conversion (%)
Forestlands	4,377,500	1,501,203	25.5
Shrublands	1,632,918	202,040	11
Grasslands	1,267,528	891,752	41.3
Sparsely or Non-vegetated	2,967,203	58,316	1.9
Snow and Ice	228,479	10	0.005

Note to figure: amount of conversion of the World Ecosystems grouped by their vegetation/land cover attribute (source: Sayre et al., 2020).The original distribution of the forestlands, shrublands, grasslands, bare areas, and snow and ice was calculated as the sum of their current distribution plus the area of those classes that have been converted into croplands and settlements.

Contribution of no conversion of natural ecosystems to other global targets

This section provides an overview of the importance of natural ecosystems and lays out the basis for supporting their conservation to achieve environmental goals such as climate change mitigation, preservation of biodiversity, preservation of freshwater, improvement of nature-contribution to people, and improvement of soil quality and net primary productivity.

[105] https://www.ipcc.ch/site/assets/uploads/sites/4/2022/11/SRCCL_Full_Report.pdf

Conversion is defined[106] as a change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.

Role of no-conversion in achieving climate targets

According to the IPCC, plausible pathways to achieving 1.5°C goals require that CO_2 emissions from the land sector reach net zero by or before 2030. This includes the near-term elimination (well before 2030) of emissions from all land use change, including deforestation as well as conversion of wetlands, peatlands, savannas, and natural grasslands. Applying these projections to corporate supply chains similarly indicates that actions required for companies to pursue a 1.5°C target must include eliminating all land use change associated with agricultural and forest commodities.

In the IPCC 2018 special report on 1.5°C, median scenarios for 1.5°C pathways with no or low overshoot have AFOLU (agriculture, forestry, and other land use) CO_2 emissions going to zero by or before 2030 and dropping to net negative emissions thereafter (see Annex 1). Because the aggregate AFOLU figure includes some sources of emissions that are more difficult to mitigate, sources that can be mitigated more rapidly – such as avoidance of emissions from land-use change linked to corporate supply chains – must be eliminated sooner to meet the overall AFOLU mitigation contribution.

The findings of the IPCC report are also reflected in the SBTi FLAG guidance and tool, which indicate corporate emissions reduction pathways that support these 1.5°C trajectories, including elimination of land use change associated with conversion of forests, wetlands and peatlands, grasslands, and savannahs (see Table 5 of the SBTi FLAG guidance).

While agricultural expansion at a global level is currently linked to greater carbon emissions from forest conversion than from conversion of other ecosystems, the opposite is true in key agricultural frontiers. In the Cerrado between 2003-2013, conversion of non-forest ecosystems accounted for more than 70%[107] of emissions from cropland expansion, with deforestation (removal of forests with 10% or more tree canopy cover) accounting for less than 30% of emissions.

Table 20 – carbon values of different ecosystems

Ecosystem	Peatland	Grasslands and Savannahs	Mangroves	Tropical rainforest
Area (HA)	423'000'000	5'250'000000	14'717'000	940'000'000
Average organic carbon stock (T C/HA)	1'450	150	856	320
Total organic carbon stock (Gt C)	613	788	13	301
Plant carbon density as a share of plant and soil carbon (%)	2%	20%	15%	68%

106

107 Noojipady, P., Morton, C. D., Macedo, N. M., Victoria, C. D., Huang, C., Gibbs, K. H., & Bolfe, L. E. (2017). Forest carbon emissions from cropland expansion in the Brazilian Cerrado biome. Environmental Research Letters, 12(2), 025004.

Soil carbon density as a share of plant and soil carbon (%)	98%	80%	85%	32%

Source: WWF, 2022

Land Use Change (LUC) is one of the primary drivers of biodiversity loss, not only directly, but also indirectly because of increased emissions which have a higher impact on climate change.

WWF (2022) understands **grasslands** as a broad term with varying definitions: dominance of grasses is the unifying trait of these definitions, although it is widely acknowledged that grasslands may also include vegetation such as trees and shrubs.

Broadly speaking, **savannahs** can be considered a type of grassland with a greater presence of trees and shrubs, and they are sometimes included within the category of woodlands. Grasslands are rich in endemic, specialized biodiversity, and they have been found to store approximately the **same amount of carbon as forest ecosystems**; as much as **30% of total terrestrial carbon**. In addition, grassland ecosystems are often more stable sinks of carbon than forests, as the vast majority is **stored below ground**, meaning it is less vulnerable to disturbance by droughts and fires than forests. In addition to their importance for mitigating climate change, grasslands and savannahs are home to incredible global biodiversity and support extremely rich flora and fauna. Moreover, grasslands and savannahs are not only significant for ecological reasons; they are also home to more than one billion people around the world for whom they provide essential ecosystem services.

According to Bardgett et al. (2020)[2], there has been a global trend of grasslands transitioning towards a net warming effect on climate: grasslands in fact, according to the author, have been increasingly contributing to global warming due to increased greenhouse gas emissions which overcompensate their storage and absorption potential of carbon. . Goldstein et al. (2020)[108] highlight that natural and sparsely grazed grasslands contain **"irrecoverable carbon" that is vulnerable to land use conversion**; once lost, this carbon is not recoverable over timescales relevant to climate mitigation. Nevertheless, there is high potential for increasing soil carbon sequestration in grasslands via improved grazing and by arresting grassland conversion and degradation.

Peatlands are important natural wetland ecosystems with high value for biodiversity, climate regulation, and human welfare. Although they cover less than 3% of the Earth's surface, they store **one-third of total global soil carbon**. Peatlands are the most carbon-dense of any terrestrial ecosystem in the world, **storing twice as much carbon per hectare as forests**. Peatlands globally hold an average of approximately 1,375 tonnes of carbon per hectare. Peatlands are important for the **long-term storage of water**, globally, as **they consist of about 90% water** and thus act as vast **water reservoirs**. Worldwide, **peatlands contain 10% of global freshwater reserves**, contributing to the water security of human populations and ecosystems downstream.

Mangrove forests occur along **sheltered tropical and subtropical shorelines** including the west and east coasts of Africa, Asia, and North and Central America. The total **carbon storage potential of mangroves** (above- and below-ground) is considerable and roughly **50% higher than that of tropical rainforests** (470 tonnes C/ha compared to 320 tonnes C/ha). The majority of the carbon is held in the waterlogged, peaty soils where it can remain stored for centuries if not disturbed. Particularly in rural coastal areas with high rates of poverty, mangroves provide a critical source of livelihoods, food, construction materials and fuel for local populations, as well as providing employment and income opportunities through fishing and tourism.

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Grasslands are rich in endemic, specialized biodiversity, and they have been found to store approximately the **same amount of carbon as forest ecosystems**; as much as **30% of total terrestrial carbon**. In addition, grassland ecosystems are often more stable sinks of carbon than forests, as the vast majority is **stored below ground**, meaning it is less vulnerable to disturbance by droughts and fires than forests.

In general, more evidence is mounting (Rosen, 2021)[3] that some ecosystems can be more resilient carbon sinks than forests. For example, Bardgett et al. (2020) highlight how afforestation can cause soil carbon loss, soil acidification and nutrient-depletion, especially when trees are planted in natural grasslands, which can make them prone to carbon loss from fires. According to the authors, moreover, large-scale afforestation also leads to changes in surface albedo, given that forests absorb more short-wave radiation than grasslands, thereby creating a warming effect. As such, changes in albedo resulting from afforestation can reduce or even negate benefits of increased carbon capture, potentially leading to a net warming effect of tree planting.

Another issue is that policies such as REDD+ focus primarily on carbon sequestration in aboveground tree biomass, while **healthy and restored grasslands can store comparable amounts of organic carbon as forests, but mainly below ground**. Grasslands have also been shown to be more effective than forests in providing **soil erosion control** and **water protection in semi-arid ecosystems**, and in some situations the conversion of grassland to forest, either through natural regeneration or afforestation, can be highly detrimental to people who depend on grasslands for forage, game habitat, water reserves, and cultural services.

Role of no-conversion in biodiversity targets

Land Use Change (LUC) is one of the primary drivers of recent and historical biodiversity loss, not only directly, but also indirectly because of increased emissions which have a higher impact on climate change. In addition to their importance for mitigating climate change, grasslands and savannahs are home to incredible global biodiversity and support extremely rich flora and fauna.

Strassburg et al. (2020)[109] highlight how restoring 30% of lands that have been converted for farming in priority areas, whilst retaining natural ecosystems, would prevent over 70% of projected extinctions of mammals, birds and amphibians. At the same time, restoring these priority lands would put the world on track to sequester almost half of all the CO_2 increase in the atmosphere since the Industrial Revolution – more than 465 billion tons. Only restoring just half of these (15% of priority areas) could avoid over 60% of expected extinctions while sequestering 30% of the total CO_2 increase.

Following this study, UNEP (2020)[110] has highlighted that, while many restoration targets are focused on forests, the evidence demonstrates the importance of restoring many different types of natural ecosystem. The agency (2020) has also stated that, of the 2,870 million hectares of converted lands identified in their research, it is estimated that 54% were originally forests, 25% grasslands, 14% shrublands, 4% arid lands and 2% wetlands.

Aware of the critical need to halt, prevent and reverse ecosystem degradation, and to effectively restore degraded terrestrial, freshwater and marine ecosystems across the globe, the United Nations General Assembly declared 2021–2030 as the United Nations Decade on Ecosystem Restoration (UN Decade). To support the implementation of the UN Decade, the agency has put forward some principles for ecosystem restoration, defined as "the process of halting and reversing degradation, resulting in improved ecosystem services and

[109] https://www.nature.com/articles/s41586-020-2784-9%20

[110] https://www.unep-wcmc.org/en/news/ecosystem-restoration-could-prevent-over-70-of-extinctions

recovered biodiversity. Ecosystem restoration encompasses a wide continuum of practices, depending on local conditions and societal choice" (UNEP, 2021)[111].

Biodiversity loss is also compromising the resilience of agricultural systems. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) synthesis report, released in May 2019, found that land use change and ocean exploitation are together by far the leading drivers of the current unprecedented loss of biodiversity, posing a serious risk to global food security. The loss of agrobiodiversity (the species, varieties and breeds of animals, plants and micro-organisms used in agriculture to produce food) is also of high concern for the global population as it greatly increases agriculture's vulnerability to pests and local weather extremes. Crop diversity has declined by 75 percent during the 20th century, to the extent that just four crops – wheat, rice, corn and potatoes – now provide 40% percent of global calories.

Additionally, the near extinction of certain pollinators jeopardizes five to eight percent of agricultural production and $235 billion to $577 billion worth of annual output (FAO, 2016)[112]. Pollination is particularly important for the production of fruits, nuts and many vegetables. Production of these foods needs to increase by approximately 95 percent by 2050 to provide healthy diets (ibid).

Contribution to other environmental and societal goals (Freshwater, Nature-contribution to people)

As very well explained by Ellis et al. (2019)[113], land is increasingly managed to serve multiple societal demands. Beyond food, fibre, habitation, and recreation, land is now being called on to meet demands for carbon sequestration, water purification, biodiversity conservation, and many others. Meeting these multiple demands requires negotiating trade-offs among the choices and differing values placed on them by diverse stakeholders and institutions.

Recent work by the IPBES (2018)[114] and others has recognized the need to accommodate a greater diversity of values into decision-making through the framework of 'nature's contributions to people (NCP)' providing a perspective on human–nature relations that goes beyond a stock-flow, ecosystem services, decision-making framing. According to the authors of the article (ibid), NCP offers real potential to enable land system science to better integrate the many diverse value systems of stakeholders and institutions into efforts to better understand and more fairly govern the increasingly wicked trade-offs of land systems in the Anthropocene, especially under conditions of less well functioning institutions and governance.

Grasslands and savannahs are not only significant for ecological reasons; they are also home to more than one billion people around the world for whom they provide essential ecosystem services. Peatlands are important for the **long-term storage of water**, globally, as **they consist of about 90% water** and thus act as vast **water reservoirs**. Worldwide, **peatlands contain 10% of global freshwater reserves**, contributing to the water security of human populations and ecosystems downstream.

In general, as also highlighted by Williams et al. (2020)[115] , although the loss of intact ecosystems to agricultural expansion has been inevitable in certain regions, development must be strategically planned in order to avoid unnecessary impacts on biodiversity and

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[111] United Nations Environment Programme (UNEP). 2021. Becoming #GenerationRestoration: Ecosystem restoration for people, nature and climate [online]. Nairobi. [Cited 10 August 2021]. https://wedocs.unep.org/bitstream/handle/20.500.11822/36251/ERPNC.pdf

[112] https://www.fao.org/news/story/en/item/384726/icode/

[113] https://www.sciencedirect.com/science/article/pii/S1877343518301635

[114] https://www.science.org/doi/10.1126/science.aap8826?siteid=sci&keytype=ref&ijkey=%2FvA6P5O%2Fb2eSM

[115] https://iopscience.iop.org/article/10.1088/1748-9326/ab5ff7/pdf

ecosystem services. Given that the magnitude of the impacts on biodiversity and ecosystem services are driven primarily by targets for land conversion, the key policy decision is what those targets should be.

Reporting requirements

Box 6: Using CDP and GRI to report on deforestation and conversion

Companies may now report both deforestation and conversion footprint and proportion of volumes that are DCF in accordance with this guide by responding to the CDP forests questionnaire and/or by developing sustainability reports that follow the GRI's Agriculture, Aquaculture, and Fishing Sector Standard, released in 2022. Following are the disclosure questions and reporting elements in these standards that align with the guidance outlined in this section.

CDP 2022 Forests Questionnaire

Question F1.7: Indicate whether you have assessed the deforestation or conversion footprint for your disclosed commodities over the past 5 years, or since a specified cutoff date, and provide details.

- *Have you monitored or estimated your deforestation/conversion footprint?*
- *Are you reporting deforestation/conversion since a specified cutoff date or during the last five years?*
- *Known or estimated deforestation/conversion footprint (hectares)*
- *Describe methods and data sources used to monitor or estimate deforestation/conversion footprint*

Question F1.5a: *Disclose your production and/or consumption figure, and the percentage of commodity volumes verified as deforestation- and/or conversion-free.*

- *Have any of your reported commodity volumes been verified as deforestation- and/or conversion-free?*
- *% of reported volume verified as deforestation- and/or conversion-free*

GRI 13: Global Reporting Initiative Agriculture, Aquaculture, and Fisheries Sector Standard

Deforestation/conversion area

- Report the size in hectares, the location, and the type of natural ecosystems converted since the cutoff date on land owned, leased, or managed by the organization.
- Report the size in hectares, the location, and the type of natural ecosystems converted since the cutoff date by suppliers or in sourcing locations.

DCF volumes

- Report the percentage of production volume from land owned, leased or managed by the organization determined to be deforestation- or conversion-free, by product, and describe the assessment methods used.
- For products sourced by the organization, report the following by product:
    - the percentage of sourced volume determined to be deforestation- or conversion-free, and describe the assessment methods used;
    - the percentage of sourced volume which cannot be determined to be deforestation- or conversion-free, and describe actions taken to improve traceability.

ANNEX 5: Land occupation intensity reduction

SBTN is considering how to address these issues based on SBTi's approach.

Besides the **absolute reduction** method, SBTi also includes the **intensity reduction** method**,** in which companies reduce intensity of impacts (per unit of product):

- Convergence option: to a common value by a given year as dictated by a global pathway
- Contraction option: at the same rate across all companies, regardless of baseline performance

Intensity Reduction Approach

With global food demand projected to grow 45% between 2017 and 2050 (Searchinger et al. 2021), it follows that if productivity in terms of food produced per hectare also grew at this rate (a 1.4% annual linear rate), no further agricultural land expansion would be needed to meet projected demand. When these productivity increases are coupled with changes to consumption (e.g., reduced food loss and waste, shifts to healthy and sustainable diets), it would exceed the 500 Mha goal of global agricultural land occupation reduction established above (Searchinger et al. 2019).

In a similar vein, the Food and Land Use Coalition (2019)'s "Better Futures" scenario also exceeds this global 500 Mha land occupation reduction goal, and includes annual linear productivity growth of 1.1%, along with demand-side measures.

To be precautionary and ambitious, the higher productivity growth (1.4% annual linear rate; 45% growth between 2017 and 2050) would be selected. This level of productivity growth also corresponds to roughly a 1% reduction in land occupation per unit of food produced per year (e.g., per kilogram).[116] Table 21 summarizes the inputs and outputs of this intensity reduction (contraction) method.[117]

Table 21 - Characteristics of the Intensity Reduction Approach

Method	Company Input	Method Output
Intensity Reduction	- Base year - Target year - Sector - Base year land occupation, disaggregated by direct operations versus upstream impacts (Step 1 output) - Activity level in the base year (e.g., amount of food produced or purchased) - Projected change in activity by target year	A reduction in the amount of land occupied by the company by the target year per unit of food, relative to the base year, using a rate of 1% annual linear reduction, and its translation to absolute change in land occupation

Absolute and intensity targets each have advantages and disadvantages (Table 24). In addition, when setting an intensity target, the choice of denominator (i.e., how the "unit" of

[116] This is because a 45% growth in productivity per hectare corresponds to a 31% reduction in land occupation per unit of food (1 / 1.45 = 0.69), which over a period of 33 years is roughly a 1% reduction in land occupation per unit of food per year.
[117] Because yields of different foods vary so widely (both between food types and across countries and regions), a "convergence" land occupation intensity reduction approach would be very complex to design.

food is expressed) would be important, and there are several options, drawing from food LCA studies (Table 5). At this time, use of total weight (e.g., kg or t), kilocalories, or protein (e.g., kg or t) would be recommended. Use of monetary values (e.g., purchasing or sales) for the denominator would be discouraged because price fluctuations can hide true trends in land occupation intensity. Although at the time of this publication there is no universally agreed-upon unit that captures overall nutritional quality, a variety of metrics and indices exist that could also be potentially used (FAO 2021, Table 10)[118].

Table 24 - Considerations regarding absolute vs. intensity targets for land occupation reduction

Aspect	Absolute target	Intensity target
Simplicity	Simpler to calculate and communicate; simpler to link to global 500 Mha land occupation reduction goal	Requires more judgment calls and can be more complex; needs additional steps to convert into absolute target to link to global goal
Equity	Bias toward large producers and purchasers; unfair for small landowners (similar to SBTi for absolute GHG emissions)	Can accommodate both large and small producers and purchasers
Link to business growth projections	No link; no guarantee that company will be "doing its share" of contribution to global productivity growth	Company "does its share" of contribution to global productivity growth
Risk of unintended consequences for nature (note: risk mitigated somewhat in v1 through the no conversion and EII targets)	Could incentivize unsustainable intensification; safeguards needed (e.g., company must also set climate and water targets, as well as v2 land targets that include soil health)	Could incentivize unsustainable intensification; safeguards needed (e.g., company must also set climate and water targets, as well as v2 land targets that include soil health)

Table 24 - Considerations for choosing denominator for intensity target

Denominator	Benefits	Challenges
Weight (e.g., kg or t)	Relatively easy to measure and communicate	Does not capture food functionality or nutrition; incentivizes commodities high in water content, including land-intensive ones (e.g., milk)
Spend or sales (e.g., USD)	Most businesses already measure this, easy to communicate	Commodity prices fluctuate so less accurate as land occupation indicator
Kilocalories	Moderately easy to measure with conversion ratios from weight; covers all foods	Does not describe nutrition more broadly than energy content; incentivizes energy-dense

[118] https://www.fao.org/documents/card/en/c/cb8054en/

		commodities, including nutrient-poor ones (e.g., sugar)
Protein	Moderately easy to measure with conversion ratios from weight; covers all land-intensive foods	Does not describe nutrition more broadly than protein content; is not meaningful for protein-poor foods and can disincentivize some healthy ones (e.g., vegetables)
Combined nutrient quality metric or index	Potentially most meaningful in terms of balancing resource use with health and nutrition	Most complex to measure and communicate; lack of consensus about which metric or index is most appropriate to use

Source: Adapted from FAO (2021), Table 10.

Example intensity target:
[Company name] commits to reduce land occupation intensity, from direct operations *[and upstream impacts]* [*reduction] %* per [*unit]* by [*target year]* from a [*base year]* base year. This corresponds to a % change in absolute land occupation by *[target year]* from the *[base year]* base year."

ANNEX 6: Mapping of incentivized response options

In addition to the target setting process, this guidance will also explore some examples of Corporate response options. In this context, response options describe the actions that a company could take to improve the state of nature on land that would be reflected in the indicator used to measure progress on their targets.

This section provides a matrix of Response Options which shows actions that companies can implement to make progress towards land targets. Consulting the matrix, companies can understand which response options may have positive contributions towards multiple targets. This framing can be a useful vehicle to inform holistic strategies for the achievement of nature and support of climate goals.

These response options are derived from an original list including publications, projects, and initiatives such as:

- IPBES Global Outlook,
- IPCC Special Report of Climate Change and Land,
- Forest Landscape Restoration assessments using the Restoration Opportunities Assessment Methodology,
- FashionPACT,
- NBS Benefits Explorer,
- WBSCD (Forest Production, Processing & Manufacturing, Downstream),
- SBTN Water Hub, and
- FLAG SBTi.

The response options have been categorized into a Land response typology of corporate response options and finer resolution options.

The Response Options for Land include specific interventions and example actions for companies to take. In Annex 6 are 65 consolidated response options classified to the SBTN's ARRRT action framework.

Companies should prioritize actions which Avoid and Reduce their pressures on nature loss. Then companies can Restore and Regenerate so that the extent and integrity of nature can recover. In addition, companies should Transform underlying systems at multiple levels to address the drivers of nature loss.

The Land Response Options have been assigned direct, indirect, and unknown pathways for each Land target benefit. This includes FLAG emissions, No Conversion of Natural Ecosystems, Land Occupation Reduction, and Ecosystem Integrity Index targets.

Information from SBTi FLAG guidance was used in assigning these benefits. Synergies across the different targets resulting from individual response options allow for robust company strategies with multiple benefits. This analysis provides a better understanding of the trade-offs for nature of certain actions. With this matrix of response options companies will be able to make logical and more impactful decisions for nature and their business. Co-benefits are sought after to protect nature and save resources and time for companies.

These interventions provide a foundation for companies to prioritize actions and places to make a difference for nature on the ground. These projects should include comprehensive actions to meet established targets. The Land Hub seeks to expand upon this response option matrix based on future targets and to measure progress on them in V2 of SBTN Land target-setting guidance. Additionally, response options in next iterations could include; literature, spatial scales, indicators, characterization factors, etc..

	Key:	Direct	Indirect	Unknown

Avoid, Reduce, Regenerate, Restore, Transform (AR3T) classification	**Response Option**	**SBTi Climate FLAG (Target Benefit)**	**No Conversion of natural ecosystems (Target Benefit)**	**Land occupation reduction (Target Benefit)**	**Ecosystem Integrity Index (Target Benefit)**
Avoid	Stop expanding the agricultural frontier				
Avoid	Minimize deforestation and degradation				
Avoid	Reduced pollution, effluents, and runoff, including acidification				
Avoid	Controlling illegal logging through monitoring and patrolling				
Avoid	Monitoring and regulating forest use				
Avoid	Manage invasive alien species (IAS)/species encroachment through multiple policy instruments (e.g. monitor silvicultural interventions, remove aggressive Indigenous species, remove invasives)				
Avoid	Conversion of habitat, conservation zones, protection areas, no-go areas, natural habitat and ecosystems, effective and representative protected areas				
Avoid	Agricultural production is not implemented on newly converted land or forests, National Parks, Wildlife Sanctuaries, Wildlife Resource Reserves, HCV areas, Ramsar Sites (wetland), highly erodible lands, or contain primary forest				
Avoid	Protect sites and surrounding areas of high biodiversity and climate mitigation value (e.g., habitat corridors, High Carbon Stock forests, parks, reserves, and protected areas)				
Avoid	Pulp/Paper not sourced from on newly converted primary or native forestland				
Avoid	The area of implementation, landfill, recycling facility or new operation is not implemented or adjacent to newly converted land or forests, National Parks, Wildlife Sanctuaries, Wildlife Resource Reserves, HCV areas, Ramsar Sites (wetland), or contain primary forest				

Avoid	Reduce use of harmful chemicals and hazardous substances (e.g. substitution with bio-based chemicals, adhesives and coatings). Avoid chemicals listed under the Stockholm Convention on Persistent Organic Pollutants (POPs) and in the annexes of the Montreal Protocol on Substances that Deplete the Ozone Layer – e.g., endosulfan, chlordane, lindane – are NOT used, and other carcinogenic, mutagenic, or reprotoxic substances are phased out. Use of approved chemicals only.				
Reduce	Supporting reduced impact logging (RIL) (e.g. reduced impact logging techniques)				
Reduce	Conservation agriculture (e.g. hedgerow plantings, crop mosaics, intercropping, windbreaks, green harvest of sugar cane, integrated pest management)				
Reduce	Increased food productivity/Closing the gap between actual and potential yield in all environments (e.g. shade-cover system, forage improvement, improve technology and tools)				
Reduce	Use land, fertilizers and pesticides more efficiently in agriculture (e.g. minimize use of chemical-based pesticides and fertilizers)				
Reduce	Reduced conversion of grassland or deforested land to sourced agricultural practices (e.g. cropland, grazing, agroforestry, feed production)				
Reduce	Improved/sustainable forest management (e.g. enrichment planting, acahuales, diversified vertical forest structure and age composition, seasonal planning, continuous cover forestry, high-stumps, retention trees, maintenance of decaying wood, silviculture, social forestry, sustainable woodland, mature forest, natural forest, secondary forest, improved woodlots)				
Reduce	Improved cropland management (e.g. brush control, crop residue management, contouring, cover crops, ground cover management, improved fallow, re-vegetation)				
Reduce	Improved grazing land management (e.g. tree range plantings, prescribed grazing)				
Reduce	Improved livestock management (e.g. agropastoral, agro-silvopastoral, silvopasture, natural pasture, perennial pastures and grains, silvopasture intensification, alterative feed)				
Reduce	Reduce disturbances (e.g., light, noise, vibration) from operations on surrounding environment (e.g., installation of silencers)				
Reduce	Monitor risks in regions of resource extraction and minimize resource extraction				

Reduce	Reduce off-site impacts of food and nonfood production (e.g. minimize disposal of old products, consolidate shipments, consolidate suppliers, ensure proper waste disposal, safe disposal of hazardous waste, food storage transformation)				
Reduce	Improving distribution and transport (e.g. localizing food systems, optimizing road network to avoid pressures on areas of high biodiversity value)				
Reduce	Reducing food waste (post harvest, customer and retailer)				
Reduce	Water-efficient agricultural practices (e.g. minimize use of water-intensive species in water stressed areas, reduce water use in nurseries, upgraded irrigation system, rainwater harvesting, contour farming, terracing, managed drainage, protect groundwater and surface water, reestablish hydrologic connection)				
Reduce	Fire management				
Reduce	Reduced soil erosion (e.g. plant vegetation buffers, conservation tillage, no-till, strip tillage, progressive or radical terraces)				
Reduce	Agroforestry (e.g. rainfed, cereal-dominated, hinterland, shade-grown coffee, flood plain, improved Milpa, irrigation, perennial crops with trees, Quesungual system, staple grains alley farming)				
Reduce/Restore	Protect, create, restore and reduce conversion of watersheds and coastal wetlands for habitat conservation, clean water supply and stormwater control (e.g. coastal green belt). Avoid establishing new water-intensive operations in water stressed areas				
Reduce/Restore	Restoration and reduced conversion of peatlands				
Reduce/Transform	Promoting and improving agricultural certification schemes and/or organic agriculture (e.g. RTRS, RSPO, organic cotton standards)				
Reduce/Transform	Promoting and improving forest certification e.g. FSC, deforestation and conversion free sector, supply chains, places and commodities				

Reduce/Transform	Encourage upcycling, increase recovery rate of products, invest in local recycling infrastructure, increase material or procedural efficiencies in sourcing and supply chains, maximize recycling of waste and processing residues, consumer awareness campaigns, circular economy, recycle raw materials, switch to more sustainable materials, minimize overproduction of raw materials, reduce packaging, reduce use of fossil-based and non renewable products, increase re-use of residuals and byproducts by other industries (e.g., paper sludge for bioenergy and fertilizer producers, paper fibers and fillers for the brick industry)				
Restore	Ecosystem and/or landscape restoration (e.g. natural regeneration, habitat fragmentation, native vegetation, pollinator habitat)				
Restore	Biodiversity, forest, and/or ecosystem conservation (e.g. protective forests, trees along roads, buffer zones)				
Restore	Reforestation, commercial afforestation, and forest restoration (e.g. marginal strip, mangroves, thin coniferous forest, remnant native forest trees, active planting, assisted natural regeneration)				
Restore	Protect, restore and establish riparian buffers (e.g. streamside management, buffer zone, forest restoration)				
Restore	Rehabilitation (e.g. degraded natural forests, quarries, silvo-pastoral, grasslands, decommissioned mills and other infrastructure, edge effects, pollution and toxics remediation and treatment)				
Regenerate	Increased soil organic carbon content (e.g. organic matter input through harvesting residues, biochar)				
Regenerate	Expanding and enhancing sustainable intensification in agriculture (including crops and livestock) (e.g. mixed production models)				
Regenerate	Prevent/reduce soil compaction and/or salinization				
Regenerate	Improve soil health (e.g. stabilize substrates, soil conservation, rice straw management, fertility management, mulching)				
Regenerate	Plantations with (e.g. annual crops, agroforests, commercial trees, bamboo, enrichment strips, open field, renewal coffee, perennial crops and trees, and timber outside of livestock areas, extended rotation system)				

Regenerate	Encouraging ecological intensification and sustainable use of multifunctional landscapes (e.g. living fences, ecological agriculture, silvo-fisheries, maintaining field margins, remove hard surfeces and barriers, border plantings)				
Regenerate	Switch emphasis of food production toward land (e.g. organic agriculture, sustainable production, sustainable rate of harvest)				
Transform	Stewardship for the provision of multiple benefits (e.g. improved land and economic and livelihood activity management)				
Transform	Reward sustainable land management practices				
Transform	Select suppliers and/or producers with eco-certifications				
Transform	Policy and/or regulatory frameworks				
Transform	Practices are implemented using a place-based project of as part of a jurisdictional approach				
Transform	Reformation of subsidy systems				
Transform	Integrated production systems, inter-sectoral coordination and cooperation				
Transform	Land-use zoning, community mapping, spatial and environmental integrated landscape planning, decentralization and co-management of land resources				
Transform	Community forests and gardens				
Transform	Improved access to markets for inputs, outputs, and financial services				
Transform	Agricultural conservation easement				
Transform	Risk sharing and transfer mechanisms				
Transform	Empowerment of Indigenous peoples, local communities, and women (e.g. collective action pathways, respect of customary land tenure, access and ownership, and/or social protection and adaptive safety nets)				
Transform	Weather and health insurance				
Transform	Improving policies relating to Payments for Ecosystem Services and Reducing Emissions from Deforestation and Degradation, esp. to encourage multifunctional land management (e.g. payment for enrichment plantings)				
Transform	Environmental incentive structures e.g. provide financial material or in-kind support for landscape restoration				

Transform	Develop and apply methods that measure farm output in terms that are more than just yield per area, but include nutritional value and wider values in terms of both costs to the environment and society and benefits of a healthy landscape				
Transform	Encouraging dietary transformations (toward plant-based, whole-food diets)				

Response options for land occupation

Measuring land occupation associated with corporate operations and value chains, and then setting targets to reduce it, can incentivize the response options detailed in Table 6.

Table 25 - Response options incentivized by land occupation reduction targets

Response option category	Comment
Avoiding deforestation and conversion of natural habitat and ecosystems	At the global scale, deforestation and conversion of natural habitat and ecosystems cannot be avoided until the area under productive use (e.g., agriculture, forestry, infrastructure, mining) ceases to expand.
Certifying deforestation and conversion free sector, supply chains, places, and commodities	Without freezing and reducing land occupation, the likelihood of leakage (of deforestation and conversion occurring elsewhere) remains high, even when companies have obtained certifications for their own value chains.
Providing financial, material, or in-kind support to landscape restoration	At the global scale, landscape restoration cannot happen at scale until the area under productive use is reduced.
Improving land management and other practices	Many practices to increase land-use efficiency can be net land management improvements, although productivity and efficiency must be enhanced in ways that safeguard soil, water resources, and natural ecosystems—and in ways that increase rather than undermine resilience.
Increasing material or procedural efficiencies in sourcing and supply chains	Reducing losses and wastes across supply chains, improving efficiency of wood harvests and use, and sourcing less land-intensive products (e.g., plant-based foods), can reduce the amount of land occupation needed to meet human demands for land-based products.
Increasing participation in jurisdictional land-use planning	Linking efforts to use working lands more productively and efficiently with efforts to protect and restore nearby lands in landscapes can be a powerful way to incentivize progress against both a "no conversion" target and a "land occupation reduction target" (for example, public support for agricultural improvement can increase political support for ecosystem protection in high-priority jurisdictions).

Depending on how the response options to reduce land occupation (and/or land occupation intensity) are implemented, there are potential tradeoffs with other response options (Table 7) that must be managed and avoided wherever possible. Setting the full range of v1 SBTN targets for land and water, in addition to climate targets through SBTi FLAG, will help companies strike the correct balance.

Table 26 - Potential trade-offs with other response options

Response option category	**Comment**
Improving land management and other practices	If done poorly, efforts to increase land-use efficiency can create tradeoffs with other aspects of land management and environmental protection. For example, overuse of fertilizer leads to water and air pollution and excessive GHG emissions. Large-scale irrigation expansion can deplete scarce freshwater resources and damage aquatic ecosystems. In addition, productivity gains can make farming and forestry more economical and spur new land-clearing. *Mitigation strategy:* Setting not only land occupation reduction targets, but also other land v1 targets (no conversion, EII), as well as climate and water targets, can help companies strike the correct balance. The wider suite of SBTN Land targets to come in v2 will also help ensure that productivity gains that reduce the intensity of land occupation do not undermine other land management goals.
Response options linked to SBTN Freshwater methods	See above.
Mitigating sources of environmental pollution	See above.

ANNEX 7: Alignment of an ecosystem target to global goals

A SBTN target for ecosystems should be measurable with a clearly defined baseline (Diaz et al. 2020) and a methodology to track progress with a reasonable level of effort. The target should be clearly linked to the actions of a company or city. For a target to be useful to the SBTN process it should be measurable at the site level, but demonstrably consistent with national commitments and global planetary boundaries.

As the most important multilateral environmental agreement for biodiversity, it is important that the ecosystem target align with the CBD's post-2020 global biodiversity framework currently in development. The draft post-2020 global biodiversity framework contains goals, milestones and targets relevant to ecosystems including:

- 2050 Goal A – the area, connectivity and integrity of natural ecosystems increased by at least X% supporting healthy and resilient populations of all species while reducing the number of species that are threatened by X% and maintaining genetic diversity.
- 2030 Milestone A.1 The area, connectivity and integrity of natural ecosystems increased by at least X%.
- 2030 Action Target 1. By 2030, 50% of land and sea areas globally are under spatial planning addressing land/sea use change, retaining most of the existing intact and wilderness areas, and allow to restore X% of degraded freshwater, marine and terrestrial natural ecosystems and connectivity among them.
- 2030 Action Target 9. By 2030, support the productivity, sustainability and resilience of biodiversity in agricultural and other managed ecosystems through conservation and sustainable use of such ecosystems, reducing productivity gaps by at least 50%.

The framework therefore focusses on three elements of natural ecosystems, their area, connectivity and integrity and specifies that these should be increased. It also provides action targets which specify the maintenance of intact areas, the restoration of degraded natural ecosystems and the sustainable use of managed ecosystems.

As discussed above, ecosystem area alone is a challenging indicator. Where a particular ecosystem begins and ends is complex – the functional unit of an ecosystem will not be constant over space or time and will transform across a gradient to a neighbouring ecosystem. Climate change is constantly altering ecosystem boundaries, and humans have also been altering ecosystem boundaries for thousands of years, so it is hard to define a desirable extent of an ecosystem.

Ecosystem connectivity focusses on the internal make-up of an ecosystem, evaluating patchiness and links within the ecosystem. Connectivity requires a detailed understanding of the construction of the ecosystem down to landscape level dynamics.

Ecosystem integrity is multi-faceted and a suitable target should represent both biotic and abiotic elements of ecosystems as well as ecosystem structure and functioning. Any metric of ecosystem integrity should be sensitive to pressures imposed by cities and companies and should be able to disentangle the interaction of pressures on the various elements, and should be meaningful when calculated over time.

What makes an ecosystem target relevant to businesses?

Ecosystem health has particular relevance to businesses and cities. The loss of ecosystem integrity reduces the provision of ecosystem services upon which businesses and cities are dependent, including the provision of clean water, a regulated climate and the pollination of crops. Any target can then be directly linked to reducing risks and creating opportunities.

Table 27: Metrics commonly used in screening ecosystem components

Indicator metric/approach	Overall ecosystem or component?	Biodiversity focus	Scope of pressures included	Usability by companies and cities
The Living Planet Index	Component: Biotic integrity	Vertebrate populations	Disaggregation to specific pressures not possible	Not applicable
The Biodiversity Intactness Index	Component: Biotic integrity	Local community intactness	Land use focus but responses to a wider range of pressures are estimated	Applicable by businesses and used in financial portfolio impact methods
Multi-dimensional Biodiversity Index	Ecosystem	Quantitative and qualitative measures of biodiversity	Metric still in development	Metric still in development
Mean Species Abundance	Component: Biotic integrity	Relative abundance of species within a community	Based on the GLOBIO model- 5 key drivers of biodiversity change	Applicable by businesses and used in financial portfolio impact methods
Global Biodiversity Score	Component: Biotic integrity	Changes to relative abundances estimated within an area	Based on the GLOBIO model- 5 key drivers of biodiversity change	Method specifically developed for corporate biodiversity foot printing
The Healthy Ecosystem Metric	Component: Biotic integrity	Alpha diversity impacted within an area	Land use focus	Specifically designed for corporate use
BILBI	Ecosystem	Beta-diversity patterns and compositional turnover	Measures impact of changing habitat condition and climate change	Challenging to apply models to corporate level impacts
Forest Landscape Integrity Index	Component: Structural integrity	Habitat condition	Both inferred and observed pressures are assessed	Challenging to understand corporate/sectoral impact on index
Ecosystem Area Index (EAI)	Ecosystem	Spatial extent of ecosystem	State indicator responsive to a wide range of pressures	Metric still in development
Ecosystem Health Index (EHI)	Ecosystem	Ecosystem functioning	State indicator responsive to a wide range of pressures	Metric still in development. Challenging to understand corporate/sectoral impact on index

ANNEX 8: Details of GHGP, AFI, SBTi FLAG

Here below is a more detailed overview of the three frameworks:

- Greenhouse Gas (GHG) Protocol Land Sectors and Removals Guidance
  - The Greenhouse Gas (GHG) Protocol Land Sectors and Removals Guidance will provide guidance for companies on **how to account for emissions and removals in the land-system**. Land SBTs v1 align with the scope and boundaries developed within the GHG Protocol as much as possible to make data collection and management easier for companies.

- SBTi and SBTi Forest, Land and Agriculture Guidance (SBTi FLAG)
  - The SBTi Forest, Land and Agriculture Guidance (SBTi FLAG), led by WWF, provides climate ambition pathways, tools and guidance for companies in land-intensive sectors (e.g. forest products, food production, processing, retailing and food service sectors) which fully incorporate land-related greenhouse gas emissions and removals (such as those related to deforestation).
  - SBTi FLAG addresses the lack of an **internationally recognised methodology for accounting and reporting on land sectors' emissions and removals**. WWF's technical staff are the leaders of the SBTi FLAG initiative and play key technical roles in SBTN Network Hub and Land Hub. The FLAG project is developing SBTi-compliant pathways for land intensive sectors for 1.5 degree pathways.
  - FLAG brings forward lessons from this experience to inform how SBTi and SBTN can align on a target setting method that contributes toward improvements for climate and nature in unison, and will develop specific guidance on restoration and regeneration actions.
  - The FLAG methodology provides two approaches to target-setting:
    - a sector approach for companies with diversified FLAG emissions, and
    - a commodity approach that includes 11 commodity pathways: beef, chicken, dairy, corn/maize, leather, palm oil, pork, rice, soy, wheat, and timber and wood fibre.
  - Both sector-based and commodity-based FLAG targets are consistent with scenarios that limit global temperature increase to 1.5°C. A company's overall target classification (1.5°C or well below 2°C) will be determined based on the ambition of its non-FLAG scope 1, 2 & 3 target. Companies may combine multiple commodity pathways and the sector pathway as appropriate for target setting.
  - The mitigation activities that companies will have to introduce in their operations and supply chains to meet their FLAG target can be seen as a sub-set of response options to reduce and revert impacts on land that will be necessary to meet SBTN land transformation and land occupation targets.

- Accountability Framework Initiative
  - The Accountability Framework Initiative (AFi) is a globally recognised framework with guiding principles and definitions for supply chains free from deforestation and conversion of other natural ecosystems. It sets **2025 as end date for stopping deforestation** and **conversion in alignment with IPCC evidence that loss of forests and natural ecosystems should end well before 2030**, to have nature on the path of recovery by 2030, which are key conditions for keeping global warming below 1.5 degrees.
  - Protecting remaining forests and stopping the conversion of other natural ecosystems will be fundamental conditions for meeting SBTN land transformation and land occupation targets, hence the **Land Hub**

developed a target setting methodology to operationalize zero-deforestation and no-conversion commitments in accordance with AFi's guiding principles and definitions (e.g., cut-off dates, target dates).

SCIENCE BASED TARGETS NETWORK
GLOBAL COMMONS ALLIANCE