

別添1 参考文献

別添1: 本編の参考文献

本編を作成する上で、引用、または参考とした文献リストを以下に示す。

第2章

No.	資料名/参考箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
1	森林に関するニューヨーク宣言(和訳)	2020	IGES	https://www.iges.or.jp/jp/publication_documents/pub/newsletter/jp/10683/%E6%A3%AE%E6%9E%97%E3%81%AB%E9%96%A2%E3%81%99%E3%82%8B%E3%83%8B%E3%83%A5%E3%83%BC%E3%83%A8%E3%83%BC%E3%82%AF%E5%AE%A3%E8%A8%80%E7%BF%BB%E8%A8%B3_IGES_20200430.pdf	PDF	2024.12
2	国連森林戦略計画 2017-2030(仮訳)	-	林野庁	https://www.rinya.maff.go.jp/j/kaigai/attach/pdf/index-45.pdf	PDF	2024.12
3	Annual report 2023	2023	Forest investor club	https://www.wbcsd.org/wp-content/uploads/2023/09/Forest-Investor-Club_2023-Annual-Report.pdf	PDF	2024.12
4	Forest declaration assessment special report Emerging forest finance instruments	2024	Forest declaration assessment	https://forestdeclaration.org/wp-content/uploads/2024/09/2024EmergingFinance.pdf	PDF	2024.12
5	Business Handbook on Deforestation and Due Diligence in Agricultural Supply Chains	2023	OECD-FAO	https://www.oecd.org/en/publications/oecd-fao-business-handbook-on-deforestation-and-due-diligence-in-agricultural-supply-chains_c0d4bca7-en.html	PDF	2024.12
6	FACT Dialogue Roadmap for Action	2023	FACT Dialogue	https://www.factdialogue.org/wp-content/uploads/2023/07/FACT-Dialogue-Roadmap-for-Action_en.pdf	PDF	2024.12
7	AWS Standard 2.0 Guidance	2020	Alliance for water stewardship	https://a4ws.org/wp-content/uploads/2020/01/AWS-Standard-2.0-Guidance-Final-January-2020.pdf	PDF	2024.12
8	EUDR	2022	EU	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115&qid=1687867231461#d1e1698-206-1	HP	2024.12
9	Corporate sustainability due diligence	2024	EU	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115&qid=1687867231461#d1e1698-206-1	HP	2024.12
10	Nature-based Solutions Blueprint	2024	WBCSD	https://www.wbcsd.org/wp-content/uploads/2024/06/The-NbS-	PDF	2024.12

No.	資料名/参考箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
				Blueprint-Building-business-cases-for-Nature-based-Solutions-1.pdf		
11	Nature-based Solutions Map	2024	WBCSD	https://www.wbcsd.org/wp-content/uploads/2024/06/NbS-Solutions-Map.pdf	PDF	2024.12
12	仙台防災枠組(仮訳)	2015	外務省	https://www.mofa.go.jp/mofaj/files/000071586.pdf	PDF	2024.12
13	Co-Chairs' Summary: Bali Agenda for Resilience: From risk to resilience: Towards sustainable development for all in a COVID-19 transformed world	2022	UNDRR	https://www.undrr.org/quick/72005	Web	2024.12
14	「グリーンインフラ創出促進事業」公募の選定結果について	2024	国土交通省	https://www.mlit.go.jp/report/press/sogo10_hh_000310.html	Web	2024.12
15	Engaging the Private Sector in Green Infrastructure Development and Financing: A Pathway Toward Building Urban Climate Resilience	2018	USAID	https://weadapt.org/wp-content/uploads/2023/05/181107_engaging_the_private_sector_in_gi.pdf	PDF	2024.12
16	生態系を活用した防災・減災(Eco-DRR)の基礎情報	-	環境省	https://www.biodic.go.jp/Eco-DRR/index.html	Web	2024.12
17	グリーンインフラ推進戦略	-	国土交通省	https://www.mlit.go.jp/sogoseisaku/environment/sosei_environment_tk_000017.html	Web	2024.12
18	Global Environment Organizations Unite to Bolster Protection of Primary Forests	2024	IUCN	https://iucn.org/news/202405/global-environment-organizations-unite-bolster-protection-primary-forests	Web	2024.12
19	Deforestation-Free Coffee	-	UNDP	https://www.mlit.go.jp/sogoseisaku/environment/sosei_environment_tk_000017.html	Web	2024.12
20	Data Discussion Paper	2022	TNFD	https://tnfd.global/wp-content/uploads/2023/07/TNFD-Data-Discussion-Paper-Mar-2022-1.pdf?v=1690527765	PDF	2025.1
21	Tools Catalogue	-	TNFD	https://tnfd.global/assessment-guidance/tools-catalogue/	Web	2025.1
22	自然との接点の分析に活用できるツールの紹介	2023	環境省	https://www.env.go.jp/content/000168517.pdf	PDF	2025.1

第3章

No.	資料名/参考箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
1	Strategic Framework 2022-31	2021	FAO	https://openknowledge.fao.org/server/api/core/bitstreams/29404c26-c71d-4982-a899-77bdb2937eef/content	PDF	2024.12
2	Strategic Plan 2022-2025	2021	UNDP	https://www.undp.org/sites/g/files/zskgke326/files/2021-09/UNDP-Strategic-Plan-2022-2025_1.pdf	PDF	2024.12
3	Implementing inclusive forest solutions to the climate crisis, one country at a time	-	UNDP	https://www.climateandforests-undp.org/	Web	2024.12
4	Digital Strategy 2022-2026	2021	UNDP	https://digitalstrategy.undp.org/documents/Digital-Strategy-2022-2025-Full-Documnt_ENG_Interactive.pdf	PDF	2024.12
5	UN Decade on Ecosystem Restoration	-	UN	https://www.decadeonrestoration.org/	Web	2024.12
6	Equator Initiative	-	UNDP	https://www.equatorinitiative.org/	Web	2024.12
7	The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022-2025	2021	UNEP	https://wedocs.unep.org/bitstream/handle/20.500.11822/42683/medium_term_strategy_2022.pdf?sequence=1&isAllowed=y	PDF	2024.12
8	WB Climate Change Action Plan 2021-2025	2020	WB	https://openknowledge.worldbank.org/server/api/core/bitstreams/19f8b285-7c5b-5312-8acd-d9628bac9e8e/content	PDF	2024.12
9	MDB Common Principles for tracking nature-positive finance	-	MDB	https://thedocs.worldbank.org/en/doc/2172d705757311c25a67451763548735-0320012023/original/2023-0329-MDB-Common-Principles-V3.pdf	PDF	2024.12
10	国別気候開発レポート	-	WB	https://www.worldbank.org/en/publication/country-climate-development-reports	Web	2024.12

第4章、第5章

No.	資料名/該当箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
1	自然環境保全分野プロジェクト方式技術協力 案件発掘・形成の手引き	2000	JICA	https://libopac.jica.go.jp/images/report/P0000001060.html	PDF	2024.5
2	課題別指針「自然環境保全」	2003	JICA	JICA 内部資料	PDF	2024.5
3	自然環境保全における住民参加：熱帯沿岸 における海洋保護区を例に	2004	JICA/中谷誠治	https://libopac.jica.go.jp/images/report/P0000162779.html	PDF	2024.5
4	住民参加による自然環境保全：事例から見 えてきたこと	2008	JICA	https://libopac.jica.go.jp/images/report/P0000174222.html	PDF	2024.5
5	JICA 公開シンポジウム「途上国の自然保護 に向けて」～ JICA と企業の新時代～報告 書	2010	JICA	https://libopac.jica.go.jp/images/report/P0000254263.html	PDF	2024.5
6	自然環境保全分野基礎情報収集・確認調査 ファイナルレポート及び国別プロファイル 1&2	2011	JICA/日本開発 サービス	https://libopac.jica.go.jp/images/report/P0000257009.html https://libopac.jica.go.jp/images/report/P0000257010.html https://libopac.jica.go.jp/images/report/P0000257011.html	PDF	2024.5
7	JICA 自然環境保全ナレッジマネジメントネッ トワークニュースレター 自然環境だより創刊号 (1 月号)JICA 自然環境保全分野事業戦略 2014-2020	2014	JICA	https://www.jica.go.jp/Resource/activities/issues/natural_env/ku57pq00001leyqb-att/201401.pdf	PDF	2024.5
8	テーマ別評価「評価結果の横断分析 自然環 境保全分野における実践的なナレッジ教訓の 抽出」報告書	2014	JICA/OPMAC	https://libopac.jica.go.jp/images/report/P1000019118.html	PDF	2024.5
9	The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management/ Ecological Applications. 6 (3): 665–691.	1996	Christensen, N et al.	https://www.jstor.org/stable/2269460	PDF	2024.11
10	Manual for Project Preparation Version 3.0	2000	CBD	https://www.cbd.int/doc/guidelines/fin-dk-gd-lns-prep-en.pdf	PDF	2024.11
11	Using the ecosystem approach to implement the Convention on biological diversity: key issues and cases studies/ IUCN Publication	2003	Maltby, E et al	https://portals.iucn.org/library/sites/library/files/documents/CEM-002.pdf	PDF	2024.11
12	ITTO Manual for Project Formulation (third edition)	2009	ITTO	https://www.itto.int/projects/formulation_manuals/	PDF	2024.11

No.	資料名/該当箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
	Project Design Guidance	2011	USAID	https://pdf.usaid.gov/pdf_docs/Pdacs686.pdf	PDF	2024.11
13	Framework for Assessing and Monitoring Forest Governance	2011	FAO	https://www.fao.org/documents/card/en?details=03cc002e-b31e-5081-af25-94fabb00f7e8	PDF	2024.11
14	Sector Environmental Guideline Forestry	2015	USAID	https://www.usaid.gov/sites/default/files/2022-05/SectorEnvironmentalGuidelines_Forestry_2015.pdf	PDF	2024.11
15	Guiding framework human rights in biodiversity conservation	2020	GIZ	https://www.giz.de/expertise/downloads/2020-GIZ_Guiding%20Framework_Human%20Rights_Biodiversity%20Conservation.pdf	PDF	2024.11
16	Guidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions	2020	GIZ	https://www.adaptationcommunity.net/download/ME-Guidebook_EbA.pdf	PDF	2024.11
17	Guidance for using the IUCN Global Standard for Nature-based Solutions : first edition	2020	IUCN	https://portals.iucn.org/library/node/49071	PDF	2024.11
18	Biodiversity Finance Reference Guide	2023	IFC	https://www.ifc.org/content/dam/ifc/doc/mgrt/biodiversity-finance-reference-guide.pdf	PDF	2024.11
19	Mainstreaming Biodiversity in Development Cooperation	2023	IIED	https://www.iied.org/sites/default/files/pdfs/2023-03/21381iied.pdf	PDF	2024.11
20	Guidelines on the Implementation of Nature-based Solutions (NbS) to Combat the Negative Impact of Climate Change on Forestry	2023	FAO	https://openknowledge.fao.org/server/api/core/bitstreams/c1b61d98-f6f4-4aeb-938d-f1ee6b575311/content	PDF	2024.11
21	2024 USAID Biodiversity Policy	2024	USAID	https://www.usaid.gov/sites/default/files/2024-12/2024-USAID-Biodiversity-Policy.pdf	PDF	2024.11
22	Biodiversity and Development Finance 2015-2022	2024	OECD	https://www.oecd.org/en/publications/biodiversity-and-development-finance-2015-2022_d26526ad-en.html	PDF	2024.11
23	Sustainable Forest Management (SFM) Toolbox		FAO	https://www.fao.org/sustainable-forest-management/toolbox/en/	HP	2025.1
24	FAO Project Formulation Toolkit, Forestry	-	FAO	https://www.faoswalim.org/resources/Agriculture/FAO_project_Formulation_toolkit/0general/1PROJCAT/1.4.htm	HP	2024.11
25	SARD Project Toolkit	-	FAO	https://www.fao.org/4/ag249e/AG249E00.htm#TOC	HP	2024.11
26	GIZ Data Lab	-	GIZ	https://www.blog-datalab.com/	HP	2024.11

No.	資料名/該当箇所	発行年	発行元/著者	収集元/ URL	形式 (PDF 等)	取得/ アクセス月
27	NBSAP Accelerator Partnership	-	NBSAP-AP	https://nbsapaccelerator.org/	HP	2024.11
28	Diagnostic tool for transboundary conservation planners (Version 2.0)	-	IUCN WCPA	https://www.tbpa.net/page.php?ndx=22	エクセル	2024.11



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森林に関するニューヨーク宣言

- 5 年間の進捗評価レポート（概要日本語訳）
- エンドーサーの視点（概要日本語訳）

森林に関するニューヨーク宣言

- 5年間の進捗評価レポート（概要日本語訳）
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日本語版翻訳：公益財団法人 地球環境戦略研究機関（IGES）

（訳者：山ノ下麻木乃、藤崎泰治、鮫島弘光）このレポートは、2014年9月に国連事務総長主催の気候サミットで採択された森林に関するニューヨーク宣言（NYDF）について紹介し、2019年に公表された以下の2つのレポートの概要の日本語訳を収録した。

NYDF Assessment Partners. (2019). Protecting and Restoring Forests: A Story of Large Commitments yet Limited Progress. New York Declaration on Forests Five-Year Assessment Report. Climate Focus (coordinator and editor). © NYDF Assessment Partners, 2019 (forestdeclaration.org よりダウンロード可能)

United Nations Development Programme. (2019). New York Declaration on Forests Endorser Perspectives Report: Progress, Challenges and Enabling Conditions for Action. New York, USA: UNDP. ©UNDP, 2019 (nydfglobalplatform.org よりダウンロード可能)

本翻訳は暫定非公式訳である。IGESは、翻訳の正確性について万全を期しているが、翻訳により不利益等を被る事態が生じた場合には一切の責任を負わないものとする。日本語版と原典の英語版との間に矛盾がある場合には、英語版の記述・記載が優先する。

1. 森林に関するニューヨーク宣言

森林・気候変動・持続可能な開発目標

森林は、人間の福祉に不可欠な社会的、経済的、生態学的サービスを提供している。現在、世界の 16 億人以上の人々が、食料、水、燃料、医薬品、伝統文化、暮らしを森林に依存している。森林はまた、陸上の生物多様性の最大 80%を支え、気候変動緩和に重要な役割を果たしている。気候変動対策、食糧安全保障、水量と水質、持続可能な生計、経済発展、環境衛生、災害の軽減など、国連の持続可能な開発目標 (SDGs) の多くは、バランスのとれた健全な森林生態系に依存している。

しかし農地拡大や持続不可能な土地利用による森林の減少が続いており、環境、生物多様性、地域の森林コミュニティや先住民に壊滅的な影響を与え、主な温室効果ガス排出源の一つとなっている。森林保全、荒廃した森林の再生、持続可能な森林・土地管理の取り組みを加速することによって、森林減少問題に対処しなければ、地球温暖化を 1.5°C 以内に抑制するという気候変動に関する世界共通の目標の達成は不可能であろう。

新たな協調的な行動と十分な資金があれば、世界は、SDGs の達成を支援しつつ、世界的に森林減少を遅らせ、食い止めることができる。森林減少からの排出削減と森林再生の増加は、温暖化を抑制し、気候変動に関する目標を達成するために不可欠である。実際、森林と土地管理の改善は、現在利用可能かつ最も費用対効果が高く、実績のある気候変動対策の一つである。森林の保全、持続可能な管理および復元のための行動は、経済成長、貧困緩和、法の支配、食料・水の安全保障、気候変動の影響からの回復力、生物多様性の保全に貢献することができる。加えて、森林に依存する先住民の意思決定への参加を促進しつつ、彼らの権利を確保するのに役立つ。

森林に関するニューヨーク宣言

2014 年 9 月に国連事務総長主催の気候サミットで採択された森林に関するニューヨーク宣言 (NYDF) は、2030 年までに森林を保護・回復し、天然林の減少を終わらせるという 10 の野心的で世界的な目標を掲げており、パリ協定、持続可能な開発目標 (SDGs)、ボン・チャレンジ¹、2020 年生物多様性戦略計画、気候変動と森林への資金拠出誓約、サプライチェーン・コミットメントなど、多くの個別の誓約や国際的合意で示された目標を組み合わせている。

NYDF の目標が実現すれば、年間二酸化炭素排出量を 45~88 億トン（米国の年間排出量にほぼ相当）削減し、気候変動に関するコミットメントの達成を加速させることができる。森林減少からの排出削減は、森林再生や自然を活用した対策（ネイチャー・ベースド・ソリューション）による炭素吸収量の増と合わせると、気候変動緩和に必要な削減量の最大 3 分の 1 を担う可能性がある。



1. 2020 年までに少なくとも天然林減少率を半分に抑え、2030 年までにゼロにする



6. 2030 年の森林保全と再生に関する野心的な量的目標値を、新たな国際的な持続可能な開発目標の一部として、2015 年以降の国際的な開発枠組みに組み込む



2. 農産物生産による森林破壊を 2020 年までに排除するという民間セクターの目標達成を支援する



7. 国際的に合意されたルールに則り、2 度目標に適合し、2020 年以降の気候に関する世界的な合意の一部として、森林減少と森林劣化による排出量を削減することを 2015 年に合意する



3. 他の経済セクターに由来する森林減少を 2020 年までに大幅に抑える



8. 森林からの排出を削減するための戦略策定と実施に対する支援を提供する

¹ 2011 年にドイツ政府と国際自然保護連合 (IUCN) によって設立された世界的なプログラムで、劣化し樹木を失った森林を 2020 年までに 1.5 億 ha 再生させることを目指している。2014 年の国連気候サミットでさらに目標が強化され、2030 年までに 3.5 億 ha 以上再生させるという目標が設定された。



4. 貧困を緩和し、持続的で公平な開発を促進する方法で、基本的ニーズ（自給農業やエネルギー源としての燃料材など）による森林減少の代替策を支援する



9. 検証された排出削減量に対する支払いをスケールアップするような公的政策や、民間セクターの商品作物調達に関する対策などを実際に行ったことで、森林からの排出を減少させた国や地方政府に報酬を与える



5. 1.5 億 ha の荒廃したランドスケープと森林を 2020 年までに再生し、全世界の森林再生率を大幅に増加させ、さらに 2030 年までに少なくとも 2 億 ha を再生させる



10. 森林ガバナンス・透明性・法制度を強化し、同時に地域コミュニティのエンパワーメントを実施し、先住民族の権利、特に土地と資源に関する権利を認める

NYDF のエンドーサー（署名団体）

森林に関するニューヨーク宣言（NYDF）は、62 の政府（国 41、自治体 21）、64 の非政府組織（NGO）、50 の民間企業、22 の先住民組織、9 つの金融機関によって支持されている。

NYDF のエンドーサー（署名団体）は、この宣言を支持する様々な理由を表明している。多くのエンドーサーは、NYDF の目標は自分たちの活動や優先事項と一致していることを挙げた。エンドーサーが NYDF を支持する共通の理由として、複数のステークホルダーの関与と協力の重要性の認識、他者とのつながりを強化することの重要性、ステークホルダー・グループ間で教訓と知見を共有する必要性などがある。

企業のエンドーサーからは、NYDF と既存の企業戦略や顧客の要求との強い整合性が支持する理由として挙げられた。また多くの場合、経営陣と CEO が持続可能性（サステナビリティ）を強く支持していたことが、NYDF を支持するだけでなく、目標に向けて行動を起こす上での大きな要因となったと述べている。

NYDF グローバルプラットフォーム

森林に関するニューヨーク宣言のグローバルプラットフォームは、2017 年 11 月に開催された気候変動に関する国連気候変動枠組条約締約国会議（COP24）において、同宣言のエンドーサーの参加と支援、および NYDF の目標達成を促進するために設立された。NYDF グローバルプラットフォームの目的は次の通りである。

- グローバルなアドボカシーを展開し、森林に関するコミットメントの実施を推進するために、ステークホルダー間の対話と協力を促進する
- 既存のパートナーシップやイニシアティブですでに行われている取り組みに基づき、重複を避ける
- 国、企業、先住民、地域社会、NGO 間のネットワーク、コミュニケーション、協力を促進し、対話の実施、共通の課題に対する解決策や問題点を共有することで、NYDF やその他のコミットメントをより良く達成するためのパートナーシップを構築する
- 能力開発や情報交換、政策への影響、森林・気候変動対策の拡大に必要な専門知識、ツール、資源、同様の問題を抱える者同士の交流、その他のサービスへのアクセスを提供する
- 森林保全・再生、持続可能な開発、気候変動対策におけるリーダーシップに対する世界的な認識を強化する
- コミュニケーションや主要なイベントへの参加を通じて、気候変動問題の解決策としての森林の役割の認識を拡大する

NYDF アセスメントパートナーズ

NYDF アセスメントパートナーズは、2015 年に NYDF の目標に向けた進捗状況をモニタリングするための独立した市民・社会団体のイニシアティブとして設立された。当初は 6 組織の連合として始まり、現在では 25 団体の強力な多様なメンバーから成るグループに成長した。日本からは（公財）地球環境戦略研究機関（IGES）が参加している。

NYDF の目標を達成するには協力して努力することが不可欠であるのと同様に、その進捗状況を評価するためにも多数の組織間の協力が必要である。NYDF アセスメントパートナーズは、透明性を促進し、NYDF を達成するための進展を促すことを目的としており、専門知識を結集して科学的かつ独立した評価を提供し、NYDF の達成に向けた全体的な進捗状況を総合的に提示するとともに、研究、アウトリーチ、アドボカシーのために協力するパートナーシップを形成している。

NYDF 進捗評価とエンドーサー・コンサルテーション

NYDF アセスメントパートナーズは NYDF 進捗評価レポートを毎年作成し、10 の NYDF 目標達成に向けた世界の進捗状況を把握している。NYDF の採択から 5 周年にあたる 2019 年に作成した評価レポート「森林に関するニューヨーク宣言 5 年間の進捗評価レポート」（第 2 章参照）では、森林減少の防止と森林の保全と再生が十分に進んでいないことを明らかにした。

また NYDF 事務局は、NYDF のエンドーサーとの間でアンケートを含むグローバルな非公式協議を 2019 年から開始した。これは、NYDF の目標達成の進捗を妨げている具体的な課題や制約を把握するとともに、エンドーサーの影響、活動の進展を支える条件、さらには NYDF の目標達成を加速させるための行動を拡大するための戦略をよりよく理解することを目的としている。2019 年に公表したレポート「森林に関するニューヨーク宣言エンドーサーの視点」（第 3 章参照）は、手本となるようなエンドーサーの目標達成のための活動紹介や、そこから抽出された教訓を取りまとめるとともに、エンドーサー個々の取り組みから森林保全を主流化する必要性も強く主張している。

2. 5 年間の進捗評価レポート（概要日本語訳）

森林の保護と再生：高い目標達成に向けた進捗はいまだ限定的

2014 年 9 月、政府、企業、市民社会、先住民組織が「森林に関するニューヨーク宣言（NYDF）」に署名した。地球温暖化を産業革命以前に比べて 2°C の上昇にとどめるためには森林減少防止が不可欠であるという共通の理解のもとに、現在 200 を超える団体が署名し、野心ある 10 のゴールを示した宣言を採択している。この宣言の 10 の目標へのコミットメント（誓約）を表明することで、署名団体は 2020 年までに熱帯林の森林減少を半分に減らし、2030 年までにゼロにする努力することに合意したことになる。NYDF はさらに、2020 年までに 1.5 億 ha、2030 年までに 3.5 億 ha の劣化したランドスケープと森林を再生することもよびかけている。

NYDF の採択から 5 年が経過したが、これらの目標が順調に進んでいるという証拠はほとんどなく、2020 年までに NYDF の目標を達成することはおそらく不可能である（p6）。2014 年以降熱帯林の減少は、持続可能とは言えない速いペースで続いている。さらに、荒廃地を再生する政治的意志は高まっているものの、牽引力を得るほど迅速には実施の努力がなされていない。これまでのところ、ほとんどの荒廃地の再生は天然林の外で実施されている。森林は商業的な土地利用に転換され続けており、これは土地利用の決定において、森林を転換することによる短期的な利益が、森林保全と再生による長期的な利益を依然として上回っていることを示している。

現状は芳しくないものの、多くの企業や公的機関が森林減少防止のための行動を実際に起こしている。しかし多くの場合、野心に欠け、個別の取り組みにとどまっている。例えば、企業は森林減少に対する責任を評価し、政府は保全と再生プログラム・プロジェクトを主導している。しかし、一般的にこのような取り組みによって森林減少の直接的・間接的な要因へ対処したり、植生再生への資金提供をしたりすることでは、行動の体系的な変化を起こすことは難しい。このような取り組みは、どちらかといえば、広範囲の社会経済的な状況から切り離されてしまっていることが多く、複数の相互に関連し合う森林減少の要因に対処するようにはデザインされていないからである。

森林に関するニューヨーク宣言 2019年の進捗評価：キーメッセージ

森林減少と森林ランドスケープの再生は強く結びついているが、別々の保護プロセスの中で取り扱われていることが多い。天然林は保護し、再生されなくてはならず、特に原生林と発展途上国に注力すべきである。

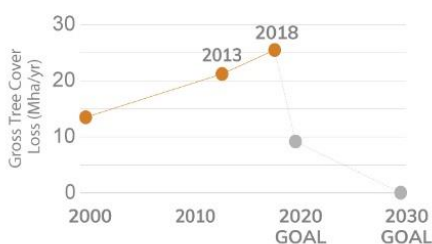
現状、期限までに残された時間が短くなるにつれ、目標は年々より野心的になっている。熱帯林保全のために世界が使える時間を使い果たしつつある。



NYDF Goal 1

世界的に見て、我々は天然林の減少を止めるために前進できていない。特に、代替不可能な原生林の消失が加速していることは問題である。

森林面積の減少速度を低減させるという目標にも関わらず、43%も加速している。



しかしインドネシアでは、政府と民間の取り組みによって、2017-2018年に森林減少率が30%以上抑制された。

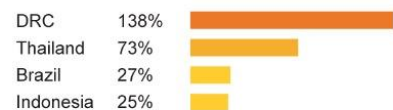
NYDFの署名以来、湿潤熱帯の原生林の年平均消失率は44%も上昇した。



ラテンアメリカでは原生林の減少が続いている。西アフリカでは近年減少率が急速加速している。

熱帯林減少による年間CO₂排出量は、EUからの温室効果ガス全排出量と同量である。

Change in average annual CO₂ emissions 2001-13 vs. 2014-18



NYDF Goal 5

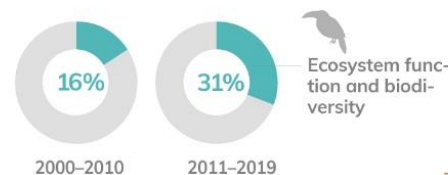
森林ランドスケープ再生実施の進捗状況はさまざまである。天然林の再生は生態系機能とサービスを回復させるために不可欠である。データが少ないため、その進捗状況を評価することは難しい。

多くの誓約がなされたことは、政治的意思の高さを示唆している。しかしながら2000年以来、2020年目標の18%しか森林または樹木の被覆が回復していない。



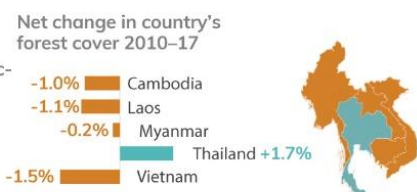
森林ランドスケープの再生は、生態的統合を回復させ、ランドスケープの多面的機能を通じて人間の福利を向上させることが目的である。

2011年以来、再生の第一の目的は、生態系機能と生物多様性の回復に変化しつつある。



自然更新と森林の生態的修復は、生態系機能とサービスに大きな利益をもたらす。森林外で実施するアグロフォレストリーは生計向上と気候変動適応に貢献する。

メコン地域におけるパイロット研究によれば、森林再生が行われているに関わらず、天然林の面積は減少している。



森林外では森林内の3倍の面積の森林が再生されている。完全に森林を再生するためには数十年から数百年かかり、天然林の減少を森林再生で相殺することはできない。

真剣に問題に対処することが求められている。今日までに実施された対応策は、体系的な変化を起こすには不適切である



農業生産のための森林減少を防止する民間事業者の取り組みはまだ軌道には乗っていない。農業以外の産業は依然として森林にリスクをもたらしている



資金が必要である。農業のためのグレー資金は、森林を守るためのグリーン資金の15倍以上もある。森林のための気候資金は全セクターの1.5%に過ぎない。



森林ガバナンスの改善のスピードは森林を効果的に保全するためには遅すぎる。それは土地所有権の付与、透明性、政策の採用、法執行力の強化を含む。

地球温暖化防止の目標を達成するために熱帯林を効果的に保全する必要がある

2014-2018 年の間に、毎年平均して英国の面積と同等の樹木被覆が失われた。アフリカでは過去 5 年間に樹木被覆地の喪失が急増した地域が新たに出現した。中南米では毎年樹木被覆面積が大きく減少しており、2019 年 6 月のブラジルアマゾンの森林減少率は、前年同月の 88% も増加した。森林減少の最大の原因は農作物栽培の拡大である。世界の森林減少の 90% 以上が熱帯地域における農作物栽培と都市化に関係している。

貴重なカーボンシンク（炭素貯留庫）として機能するかけがえのない原生林の減少が加速していることには、特に警戒が必要である。2014-2018 年の湿潤熱帯原生林の減少は、2002-2013 年に比べ 44% 増加した（年間 300 万 ha から 430 万 ha に増加、四国の 2 倍程度の面積に相当）。2014-2018 年には、熱帯地域の樹木被覆地の減少によって年間平均 4.7 GtCO₂ が排出されたが、これは 2017 年の EU の温室効果ガス排出合計量よりも多い。これらの排出の半分近くは湿潤熱帯原生林で発生している。

良いニュースは、インドネシアの原生林減少が 2017-2018 年に大幅にスローダウンしたことである。年間平均森林減少率は、2002-16 年に比べて 30% 以上減少した。政府、民間企業、NGO による対策の実施と、火災の発生と拡大を抑制する気象条件が重なったことが、この 2 年間の森林減少の大幅な抑制につながっている。しかし、2019 年には、インドネシアは 2015 年以来最悪の火災を経験しており、森林減少を防止するためには、保全努力をさらに強化し、追加的な対応策の実施が不可欠である。

森林生態系の再生を加速しなければならない

森林ランドスケープの再生は、失われた森林の生態系の機能とサービスの一部を回復させることを通じて、森林減少の防止の努力を補完するものでなければならない。森林ランドスケープ再生によって生み出される便益は様々であるが、劣化した森林ランドスケープに樹木を補植することで、空気や水の質と供給を改善することや、土壌流失や洪水のリスクを軽減させることができる。より大きなスケールでは、森林の再生は生物多様性を高め、大気中の炭素の吸収につながる。しかし、成熟した天然林が 100 年以上かけて蓄積した炭素量を補うには長い時間がかかることを考慮しなければならない。耕作地や牧草地のような劣化した非森林ランドスケープにおいて、アグロフォレストリー・システムによって樹木被覆を増加させることは、地域コミュニティへの便益となる生態系サービスをもたらすことができる。新規植林や大規模なバイオエネルギー原料の生産によって植生被覆を増加させる場合には、気候変動緩和以外の生態系サービスとトレードオフになる可能性や、必要な制限に関する十分な検討が必要である。これは特に、自然生態系を外来種の単一造林に置き換えるような場合に重要となる。

劣化したランドスケープの再生に対する政治的意思は強いものの、森林ランドスケープ再生のコミットメントを実際の行動につなげることは困難に直面している。森林面積や樹木被覆面積の増加としてこれまでに実現しているのは、誓約された再生に関する目標のごく一部にとどまっている。2019 年 4 月時点で、ボン・チャレンジで寄せられた国、地方自治体、企業からのコミットメントは 59 件で、2020 年と 2030 年に対するコミットメントを合計すると 1.7 億 ha 以上の森林を再生することが約束されていることになる。しかしながら、2000 年以降に実際に再生された森林面積は 2,670 万 ha であり、2020 年の森林ランドスケープ再生目標（1.5 億 ha）のわずか 18% にすぎない。

森林ランドスケープ再生をモニタリングするためのデータの入手と資金確保の制約が、実際の進捗状況の定量的評価を困難にしている。衛星データを利用したメコン地域のケーススタディは、実際に森林再生がどのように起こっているかを理解する重要な情報を提供している。このケーススタディの結果によれば、2010 年以降の樹木被覆増加のほとんどは、森林内ではなく森林の外（耕作地、灌木地などの非森林地）で起こっており、天然林の減少は止まらず 30 万 ha が失われた。森林の外の樹木は、重要な社会経済的、また生計上の便益をもたらすが、天然森林生態系の重要な機能である生物多様性の保全と炭素貯留機能を強化するためには、その保護と再生のための対策をもっと実施する必要がある。

森林減少の要因：より大規模で調整のとれた行動が必要である

森林減少の要因に対処する努力は徐々に進んでいる。多くの政府は、森林を保全し森林減少と劣化を抑制するための戦略を採択した。また、パリ協定の下で各国政府が策定した自国が決定する貢献（NDC）には土地利用に関連した緩和と適応行動が含まれており、森林ガバナンス強化に一定の進捗が見られたといえる。多くの企業がサプライチェーンから森林減少を排除するというコミットメントを立て、金融機関は森林に悪影響を及ぼす投資の選別を開始した。森林減少抑制と森林保全を目的とするプロジェクトやプログラムを実施するために、市民社会は現地の地域コミュニティと協働すると同時に、サプライチェーンの透明化を支持している。しかしながら、実施の速度が遅いこと、活動の地理的範囲が限られている上にサプライチェーン全体や業界間で完全には統合されていないことから、現在の活動は NYDF の目標を達成するには十分ではない。

サプライチェーンから森林減少を抑制または排除するコミットメントを持つ企業数の増加は、過去3年間足踏み状態にある。すべてのサプライチェーンと事業を通じた森林減少ゼロのコミットメントを設定している企業数は、コミットメントを持つ企業全体の8%にとどまっている。企業のコミットメントに向けた実際の行動実施の遅れは、優先的に実施する行動についての合意の欠如、リスクの所在に関する限られた理解、そして経済的な利益が不明瞭であることによって、企業が持続可能な活動に対する投資を躊躇していることに起因している。さらに、コミットメント達成に向けて取られた行動と進捗に関する企業の報告は、サプライチェーンを通じた森林減少ゼロアプローチの効果を評価するには適切ではない。

業界全体での取り組み（セクターワイドアプローチ）は森林減少の抑制につながる。ブラジルのアマゾン地域における大豆モラトリアム²とインドネシアの泥炭地におけるモラトリアム³はそれぞれ効果をもたらしている。ただし大豆モラトリアムは、アマゾン以外の地域に大豆栽培に起因する森林減少を移転させている兆候がある。多くの生産国において自治体レベルでの共同行動の動きが増加しており、新しい道筋としての可能性を秘めているが、これらの自治体レベルのアプローチの実施ははまだ初期段階にあり、農業に由来する森林減少に対して大きな影響はまだ現われていない。また、生産国と消費国の政府による民間企業のコミットメント実施を円滑に進めるための取り組みはまだ限られており、ほとんどの場合ハイレベルの政策や誓約にとどまっている。

鉱物資源や石油・ガスに対する地球規模の需要は、今後大幅に増加することが予想され、採掘活動による森林消失リスクは増加する。アマゾン、コンゴ盆地、東南アジア地域において、インフラストラクチャー開発計画と新たな採掘、オイル・ガスプロジェクトによって、現在手つかずの森林の減少と断片化が加速することが予想されている。より一層懸念されるのは、多くの国において保護地域が新たな開発地域に戻される傾向である。一方で、破壊的な採掘事業に反対するコミュニティを中心とする動きが国際的に認識され、いくつかの法的勝利を収めており、経済セクターにおける森林と生物多様性の保全の主流化へのハイレベルの支持が増加している。しかしながら、この進捗は、これらのセクターの森林に対するアプローチの真の変革にはまだつながっていない。

貧困もまた森林の消失を引き起こす。代替的な生計手段の欠如と高まる人口圧は、時に基本的ニーズを満たすための持続可能な森林利用の引き金となる。例えば、移動耕作はコンゴ民主共和国の全森林の4分の1以上で実施されており、樹木被覆率減少の70%の原因となっている。本来、移動耕作システムでは二次林の再生と土壌肥沃度の回復が可能だが、人口増加によって移動耕作システムに歪みが増している。農民は、移動耕作サイクルの短期化という圧力に直面しており、それにより生産性が低下し、最終的には原生林を切り開くことで農地を拡大せざるを得なくなる。同様に、拡大する都市からの需要に促進され、森林を伐採して木炭と換金作物を生産することは、代替の生計手段がない地域の貧困住民の数少ない現金獲得手段となっている。コンゴ盆地の原生林と林地の攪乱の速度は2001年から2014年にかけて2倍となったが、同時期の人口増加（移民を含む）と相関関係にあることを衛星データが示している。

貧困と人間開発に関するプログラムの多くは森林への影響を追跡していないため、森林減少防止に対して具体的にどの程度の支援が実施されているのかを判断することは難しい。しかしながら、貧困と資源の劣化の関係についての理解の高まりは、小規模の商業活動の形成やクリーンな調理用コンロの導入などの支援の有効性の改善につながっている。

実施条件を改善することが森林に関する目標の達成に不可欠である。

上述の森林減少の各要因に対応するための信頼のおける国内、国際社会からの公的資金と民間資金が無ければ、国際的な森林目標も各国内の目標も達成することはできない。このことは、新しい資金の流れが必要であり、そしてそれ以上に、主流資金を、森林保全に効果を上げる活動に対して向けさせる（「グリーン資金」供給）ことが必要である。今日、グリーン資金の供給量は、森林減少レベルの高い国へ供給されている「グレー資金（森林減少の要因となる可能性をはらんだ資金）」の供給量に比べてごくわずかに過ぎない。農業開発資金は森林分野の気候変動緩和資金の15倍に達する。さらに、企業と政府は、森林に害を与える可能性のある活動に対して補助金や支援を引き続き提供している。金融機関は、たとえ利益を生むとしても、投資と資金が森林減少に加担していないことを確実にするために必要なセーフガードを設定する必要がある。

² 2006年以降に新規開拓された畑からの大豆購入を禁止する民間による協働的イニシアティブ。NGOや消費者の働きかけを受け、ブラジルの大手大豆加工業者と輸出業者が開始した。

³ インドネシア政府による、天然林と泥炭地の新規開発事業の発行停止。2011年より実施され、2019年に恒久化された。

資金の変化に加えて、より新しい資金が必要である。森林のためのグリーン資金の総額は、現在 220 億米ドル以下であることが、本レポートで明らかになった。我々が 2017 年に NYDF の資金目標に関する詳細な評価を行ってから、森林のための全体的な資金は多少（9%）増加したが、熱帯諸国の森林減少と保全に対する支援は、2010 年以降、気候変動緩和のために多国間機関と先進国が表明した 2,560 億米ドルの 1.5% 以下、わずか 32 億米ドルにとどまっている。再生可能エネルギーセクターに対してだけでも、森林に対する資金の 100 倍以上の資金コミットメントが出されている。

需要側の対策は森林減少の要因に対処するために重要な役割を果たす。アムステルダム宣言など国際的な宣誓が商品作物のサプライチェーンから森林減少を排除するために行われた。しかしながら、具体的な行動と法的措置をとっているのは木材セクターだけである（例：EU 木材規則、米国の改正レイシー法）。EU は、輸入に伴う森林減少を抑制するための法的及び非法的措置を検討していること、そして森林の保全と再生の支援に関する国際協力を強化するというシグナルを、「新たな森林減少と劣化に対する EU の行動のステップアップに関する欧州委員会の通達（European Communication on “Stepping up EU Action against Deforestation and Forest Degradation”）」を通じて発信している。また EU は、より持続可能な土地利用の実践の支援に資金を向ける方法も検討している。

良いガバナンスは、資金とともに、政策の策定、法の施行、改善に向けた投資と実施の条件の基礎となる。土地所有制度、透明性、政策の採用、執行の強化を含む森林ガバナンスの改善の進捗は、森林が直面している加速する脅威に比べると非常に遅い。業界における合意や認証制度など新規及び既存の政策と手段によって、商業活動が森林に与える影響を最小化することが出来る。しかしながら、それらの効果は実施条件によって変わる。条件には、強固なガバナンス、優れた政策デザイン、規制官庁間で対立する利害関係の調整が含まれる。ブラジルでは 2019 年の政権交代以降、森林保全政策に関する法的枠組みと制度の反転によって、森林減少が増加したが、これは政治的優先順位の変化に対する森林政策の脆弱性を証明している。

森林生態系の効果的な保全には、森林保全に関する先住民と地域コミュニティの貢献を認識することが必要である。コミュニティが森林を管理するための完全な土地の権利を有する場合、森林とそこに貯留された炭素は時間の経過につれてより保全される。しかしながら、先住民と地域コミュニティの土地の権利はいまだ完全には認識されておらず、権利保護の獲得に苦心している。世界の土地の約半分が、世代を超えて利用、所有、占有してきた先住民と地域コミュニティの慣習的所有権に関する長期的にわたる主張の対象となっている。

未来への展望：2030 年への道筋

NYDF の目標を達成し地球温暖化を 2 度以下に抑えるためには、天然林、なかでも原生林の保全と再生が不可欠であり、特に熱帯諸国の森林再生と保全努力に着目することが重要である。しかしながら、生物の生息域と生態系サービスの回復には何十年から何世紀もの時間がかかることから、森林再生によって森林減少を相殺（オフセット）することは不可能である。森林再生は、森林減少防止の「代替策」ではなく、追加的な対策として活用することが重要である。

それと同時に、増加する人口を養いながらも土地への過度なプレッシャーを排除するためには、食料、燃料、繊維生産が直接的・間接的に引き起こす森林減少を減らさなければならない。このため、小規模農家と基本的ニーズを求める人々の生産システムの向上、様々なセクターの土地管理と実践の改善、そして富裕層が持続可能な植物性の食生活を取ることで、食品廃棄と食品ロスの減少に向けた大幅な転換が求められる。

食料安全保障や公衆衛生、地域開発などその他の優先事項を目的とした政策は、それらのプログラムの優先事項に保全を取り入れるべきである。複数の目標を束ねる公共政策は、一つの目標しか持たない政策に比べより多くの幅広い資金支援を得やすいため、より強固となりえる。例えば、農業生産性に対する持続的な投資、土地の権利、公衆衛生、地域のインフラストラクチャーと制度への投資、市場へのアクセス、生物多様性、生態系サービスなどの目標は並列的に設定できる。さらに、政策がより効果的になるためには、ステークホルダーに対して説明責任を果たしながら実施され、その進捗が測定、モニタリングされなければならない。

3 エンドーサー（署名団体）の視点（概要）

日本語訳）

進捗、課題、行動を可能にする条件

本報告書は、森林に関するニューヨーク宣言(NYDF)のエンドーサー（署名団体）の視点を紹介するものである。2014年に同宣言が発表されてから5年間に得られた教訓、前進を阻む障壁、エンドーサーの行動を可能にする条件などを、10の目標の達成にむけた進捗状況とともに検証している。森林減少防止に取り組み大きな成果を上げるためには、測定可能な共同行動が今すぐ必要であるという認識のもと、NYDFの支持者の課題、行動、進捗状況の把握をエンドーサーとの対話とアンケートによって試みた。エンドーサーとの対話は、15の国と8の自治体政府（政府エンドーサーの37%）、29のNGO（NGOエンドーサーの45%）、21企業（企業エンドーサーの36%）、11の先住民組織（先住民組織エンドーサーの50%）に対して実施した。エンドーサーとの対話から8つの教訓が得られた。

レッスン1：複数レベルおよび複数セクターの解決策を必要とするような障壁が存在するため、企業や政府による「デフォレステーション・フリー⁴」コミットメントの実施が遅れている

森林の減少を食い止め、森林を保護・再生するという各コミットメントによって、森林問題と気候問題の共通の目標に近づくことが可能になるが、実際にこれらのコミットメントを達成するための測定可能な行動とそれを実施するための道筋は、より困難であることがわかっている。このような障壁を克服するには、測定可能で期限の定められた目標の策定、複数のステークホルダーの協力、ハイレベルの政治的意思の変化、森林減少に加担する可能性を孕んだグレー資金からその可能性を排除したグリーン資金への転換と実施拡大のための財政的インセンティブの増加、一貫した（可能であれば第三者機関を通じた）モニタリングと説明責任戦略、デフォレステーション・フリー製品の需要を支える政策などに、支援を提供する必要がある。

レッスン2：強力なガバナンスと政策がエンドーサーの行動を可能にする必須の条件であり、それが存在しない場合には行動実施の障壁となる

強固で一貫性のある政策とガバナンスは、森林減少に対処し、森林と土地を保護・再生し、持続可能な森林管理を行うための行動を可能にするための条件である。政治的意志の弱さ、限られた透明性、汚職、違法な森林伐採に対処するための法執行の欠如などが、すべてエンドーサーの活動の大きな障害となっている。政治的な変化にかかわらず、森林と森林に依存して暮らす地域コミュニティが継続的に保護されるためには、この分野におけるさらなる取り組みが必要である。

レッスン3：森林減少問題を先駆的に取り組む個人のリーダーシップによって、組織や業界全体の行動を形成することができる

ハイレベルの政治家のリーダーシップは、機関をまたいだコミットメントの採択とそのようなコミットメントを実現させるために極めて重要である。しっかりとした制度的枠組みと実力主義的システムを採用する国や地方では、政権交代による悪影響を回避することができる。企業の上層部が森林と気候に関する行動を推進するためのリーダーシップを発揮することは、コミットメントの採択と現場での実施に不可欠である。先住民組織は、国際的な森林と気候の課題に影響を与えるために、世界中で同盟関係を強化し賛同者と連携してきた。

レッスン4：森林に関するコミットメントの実施は、複数のステークホルダーの関与とパートナーシップ次第であることが多い

⁴ デフォレステーション・フリー：森林減少を伴わない経済・社会活動を意味する。例えば、森林減少を引き起こさずに生産された農林作物のみを輸入することや、森林に悪影響を及ぼす事業に投資しない金融サービスを提供することが含まれる。

NYDF の野心的な目標を達成するためには、複数のセクターや関係者が協調して関与し行動することが不可欠である。これらのパートナーシップとマルチステークホルダーが協働する活動は、セクター間の信頼を促進することができ、利害が対立しがちな分野で取り組みを進めていくために、特に有益であることが証明されている。マルチステークホルダーによる協力について、エンドーサーは、金融機関や実施機関との連携、同じ地域や同じ商品分野に関係している他のエンドーサーとの連携、学習交流や特別な連携を通じた教訓と課題の共有を重要と考えていた。

レッスン 5：説明責任と透明性に関係する技術開発は近年加速しているが、オープンで透明性の高いデータへのアクセスは依然として課題となっている

農産物のサプライチェーンは透明性が不十分で、トレーサビリティが限られた状態にある。NYDF の複数のエンドーサーは透明性に関係する課題について指摘しており、その原因は、データが限られているか不完全であることと、競争力や評判に関する懸念があることである。複数の産業、特に牛肉、パーム油、大豆、紙、コーヒー、ココア、ゴムなどの森林減少に関連している産業を横断した共同の活動とモニタリングの必要性は広く認識されていたが、これを達成するための実際の行動は限られたものにとどまっていた。

レッスン 6：土地所有の明確化は、紛争を防止し、森林を持続可能な形で保護・管理するための前提条件である

先住民と地域コミュニティは、世界の自然に蓄積された炭素量の 4 分の 1 を管理し、世界の土地の 50% 以上を所有しているが、これらの土地の所有は正式に認められておらず、登録もされていない。土地所有に関する紛争の解決策には、土地の権利を明確化し統合するためのプロセスに関して合意を行い、そのようなプロセスを実施するための財政支援を確保することが含まれる。

レッスン 7：森林に負の影響を与える財政投資が存在し、森林保全のための投資は不足している状況にある中で、NYDF の目標を達成するためには森林への資金調達の新しいモデルが有望である

世界の自然は 125 兆米ドルもの経済的価値を提供しているにもかかわらず、自然を保護するための投資は著しく不足しており、現在行われている融資は陰で森林減少と劣化を促進させてしまっている。私たちの現在の経済は森林の真の価値と利益を適切に考慮しておらず、森林と土地管理改善に拠出された公的な気候変動緩和資金は、全体のわずか 2% である。森林の重要性について説得力のあるストーリーを構築するには、新しい経済と認識のパラダイムシフトが必要である。現在の認識の枠組みをわずかに変えるだけでも、森林にとっては大きなプラスの結果をもたらす可能性がある。

レッスン 8：森林再生や自然を活用した対策（ネイチャー・ベースド・ソリューション）は社会的利益をもたらすが、その価値は十分に認識されていない

森林の減少や劣化を引き起こしている政府や企業は、森林の価値を認識していないことが多い。このことは、森林に対する評価を歪め、国連の持続可能な開発目標（SDGs）の達成を支援するために森林に投資する機会を逸してしまうことにつながる。NYDF のエンドーサーによる森林の回復と持続可能な管理のための活動は複数の SDGs に貢献しているにもかかわらず、それらの活動が SDGs 促進の支援として有益であることは見過ごされがちであった。

2020 年以降のビジョン

2020 年が近づくにつれ、「5 年間の進捗評価レポート」の結果を考慮すると、森林減少の増加傾向を反転させ、世界的な森林と気候の目標に向かって前進するためには、すべてのエンドーサーが、説明責任を強化しつつ、野心を新たにしていなければならない。アンケートに回答した NYDF エンドーサーの 3 分の 2 近くが、2020 年以降の目標に向けた行動計画を表明しており、具体的な優先事項も明確に示している。具体的には、a) 森林リスクを減らすためのセーフガードと政策の実施、b) 生計と能力開発の支援、c) ネイチャー・ベースド・ソリューションと保全、d) 需要と消費を含む農業市場、e) 透明性と説明責任、f) 開発と生物多様性と気候に関する課題の調和、g) ガバナンス、である。NYDF グローバルプラットフォームの 2020 年以降のビジョンでは、80 を超える NYDF エンドーサーとの協議から収集された提言やフィードバックを組み込むことに焦点を当てており、それには、実施の強化、説明責任への取り組み、イニシアティブや連携との相乗効果の最大化、知識共有の支援に関する戦略が含まれている。

国連森林戦略計画 2017-2030

I. はじめに

A. ビジョン及びミッション

1. 森林は世界で最も生産性が高い陸上生態系であり、地球上の生命にとって不可欠なものである。「国連森林戦略計画 2017-2030」（United Nations Strategic Plan for Forests 2017-2030：以下、「UNSPF」という。）は、あらゆるタイプの森林及び森林以外の樹木を持続的に管理経営し、森林減少及び森林劣化を抑止するためのあらゆるレベルの活動に対する地球規模での枠組を示すものである。また、「持続可能な開発のための 2030 アジェンダ」（以下、「2030 アジェンダ」という。）、国連気候変動枠組条約の下で採択されたパリ協定、生物多様性条約、砂漠化対処条約、国連森林措置（United Nations Forest Instrument：以下、「UNFI」という。）及びその他の国際的な森林に関連する文書、プロセス、約束や目標の実施に向けた、森林関連の貢献の枠組でもある。
2. UNSPF は、国連システムの森林に関連する活動に加え、以下に掲げるビジョン及びミッションに向けた国連機関その他のパートナー機関の間の一貫性、連携、相乗効果の醸成のための参照枠組になる。また、「森林に関する国際的な枠組」（International Arrangement on Forests：以下、「IAF」という。）及びその構成員の活動に関し、一貫性を向上させ、指針を示し、重点化するための枠組として機能する。

共有される国連のビジョン：

3. 共有される国連のビジョンは、あらゆるタイプの森林及び森林以外の樹木が、持続的に管理経営され、持続可能な開発に貢献し、経済的、社会的、環境的及び文化的な便益を現在及び将来世代の人々に提供する世界である。

共有される国連のミッション：

4. 共有される国連のミッションは、あらゆるレベルでの協力、連携、一貫性、相乗効果、政治的な意思及び活動の強化等により、持続可能な森林経営や、森林及び森林以外の樹木の 2030 アジェンダへの貢献を促進することである。

B. 人々と 2030 アジェンダにとっての森林の重要性

5. 森林は地球の陸地面積の 30%以上、約 40 億 ha あり、人類や持続可能な開発、地球の健全性にとって必要不可欠なものである。世界の人口の約 25%に相当する約 16 億人の人々が、基礎食料、生計、雇用及び収入を森林に依存している。
6. 森林は、木材、食料、燃料、飼料やシェルター当の重要な生態系サービスを提供するとともに、土壌や水の保全、きれいな空気等に貢献する。森林は、土地の劣化や砂漠化を防ぐとともに、洪水、地すべり、雪崩、干ばつ、砂塵嵐、砂嵐その他の自然災害のリスクを減少させる。陸域の生物種の約 8 割に生息・生育の場所を提供するとともに、気候変動の緩和及び適応、生物多様性の保全に大いに貢献している。

7. 持続的に経営されれば、あらゆるタイプの森林は、健全で、生産性があり、強靱で、再生可能な生態系であり、世界中の人々に必要な財及びサービスを提供する。多くの地域において、森林は重要な文化的、精神的な価値も有している。UNFIに示されたとおり、「持続可能な森林経営は、ダイナミックかつ進化している概念として、現在及び将来世代の便益のためにあらゆるタイプの森林の経済的、社会的、環境的な価値を維持し、高めることを目指す」。
8. 森林及び森林以外の樹木の持続可能な管理経営は、「持続可能な開発目標」（Sustainable Development Goals：以下、「SDGs」という。）、特に目標 15（持続可能な森林の経営、砂漠化への対処、土地の劣化阻止・回復及び生物多様性損失の阻止）の達成を含む 2030 アジェンダの統合的な実施に不可欠なものである。
9. 人々にとっての森林の無限の重要性を踏まえ、国連総会は決議 67/200 により 3 月 21 日を国際森林デーとして宣言し、毎年世界各地で森林に関連する啓発や行動促進のための行事が行われている。

C. 傾向及び課題

10. 地球上の生命や人類に対する森林の極めて重要な貢献にもかかわらず、木材、食料、燃料、繊維の需要に応えるため、多くの地域で森林減少や森林劣化が続いている。森林減少の原因の多くは、森林セクター以外にあり、貧困の削減、都市の開発に加え、農業、エネルギー、鉱業、交通等の、より多く、かつより早く金銭的リターンが得られる土地利用を優先する政策に代表される、より広範な社会経済的要因に根差している。
11. また、森林は、違法あるいは持続可能でない伐採、抑制されない火災、公害、砂塵嵐や砂嵐、災害、病気、病虫害、侵略性外来種、分断、深刻な気象現象等の気候変動の影響等の危機にさらされている。これらいずれもが、森林の健全性や生産的で強靱な生態系としての機能の発揮を脅かすものである。
12. 人口の急増や一人当たりの収入の増加が続くことは、林産物やサービスに対する世界の需要と消費を加速させるなど、森林への利用圧力となっている。世界の人口が 2050 年までに 96 億人に達すると予測される中、林産物やサービスに対する将来の需要を満たせるかは、森林の保全、再生、拡大を含め、持続可能な森林経営を確実にするための、あらゆるレベルでの喫緊の行動やセクター間の政策調整にかかっている。
13. 世界レベルでは、森林の問題を扱う多くの国際機関や組織等の分断を減少させ、連携を強化する必要がある。
14. 国、地方、地域レベルでは、森林に関連するセクター間の連携は不十分で、森林を担当するセクターやステークホルダーは土地利用計画や開発の意思決定に際し、十分に関与していないおそれがある。
15. 持続可能な森林経営の効果的な実施は、後発開発途上国、内陸の開発途上国、小島嶼開発途上国、経済移行国を含む開発途上国に対し、資金供給、能力開発、環境により技術の移転

等の十分なリソースに加え、とりわけ革新的な資金源を含む増額された財源を動員する必要性に依存している。持続可能な森林経営の実施は、あらゆるレベルでの良いガバナンスにも大きく左右される。

D. 持続可能な森林経営の活動を拡大させ、価値を向上させる絶好の機会

16. UNSPF の開始は、世界の森林やその多様な価値、機能及び便益を現在及び将来にわたって守るため、国連システムの内外において、あらゆるレベルの全ての主体が、強力で断固とした行動を起こそうとする、またとない機会となる。
17. UNSPF は、2030 アジェンダ、アディスアベバ行動目標、気候変動枠組条約の下で採択されたパリ協定の採択に代表される 2015 年の世界的な画期的成果の上に築くことを目指したものである。
18. 国連システムは、あらゆるタイプの森林及び森林以外の樹木の持続可能な管理経営のための一連の世界目標及びターゲットを達成することにより、これらの取組に貢献するとともに、森林のビジョン及びミッションを実現することができる。

E. IAF

19. IAF は、国連経済社会理事会の機能委員会である国連森林フォーラム（United Nations Forum on Forests：以下、「UNFF」という。）及びその 197 の加盟国、UNFF 事務局、「森林に関する協調パートナーシップ」（Collaborative Partnership on Forests：以下、「CPF」という。）、世界森林資金促進ネットワーク（Global Forest Financing Facilitation Network：以下、「GFFFN」という。）及び UNFF 信託基金から構成される。UNFF は、森林に関連する課題を統合的かつ包括的に取り扱う権限を有する国連組織であり、UNSPF や UNFI の実施、GFFFN の運用を監督する。
20. UNFF の活動は、UNFF 事務局、UNFF 信託基金及び CPF により支えられている。CPF は国連食糧農業機関（Food and Agriculture Organization of the United Nations：以下、「FAO」という。）が議長を務める自発的なパートナーシップであり、森林に関する重要なプログラムを有する 14 の国際機関から構成される。UNFF、UNFF 事務局及び CPF の機能は、経済社会理事会決議 2015/33 に示されている。
21. IAF は、森林に関するプログラムを有する様々な国際機関、地域機関、準地域機関、非政府組織及びプロセスをパートナーとし、世界中で持続可能な森林経営を推進し、実現する上において、メジャーグループその他の関連するステークホルダーの果たす重要な役割をあらゆるレベルで認識している。
22. IAF の目的は以下のとおりである。
 - (a) あらゆるタイプの森林の持続可能な経営、特に UNFI の実施を推進する。
 - (b) あらゆるタイプの森林及び森林以外の樹木の 2030 アジェンダへの貢献を強化する。
 - (c) あらゆるレベルで森林の課題に関する協力、連携、一貫性及び相乗効果を強化する。

- (d) 北南、南南、北北、3カ国間協力を含む国際協力、あらゆるレベルでの官民パートナーシップやセクター横断協力を発展させる。
- (e) 持続可能な森林経営の達成を図るため、UNFIに基づき、森林ガバナンスの枠組や実施の手段を強化するための取組を支援する。

II. 世界森林目標及びターゲット

- 23. 2030年までに達成すべき6つの世界森林目標及び関連する26のターゲットがUNSPFの核となるものである。以下に示すこれらの目標及びターゲットは、UNFIに掲げられた4つの森林に関する世界目標が示す確固たる基礎を包含するとともに、それらを十分踏まえたものである。
- 24. 世界森林目標及びターゲットは任意かつ全世界的なものである。これらはIAFの目的を支えるとともに、SDGs、愛知目標、気候変動枠組条約の下で採択されたパリ協定、その他の森林に関する取組、プロセス、約束や目標の進捗に貢献することを目的とする。
- 25. 2030アジェンダに定められたビジョン、原則及び約束は、世界森林目標及びターゲットに根拠を与えるものであり、それぞれが相互に関連するとともに、持続可能な森林経営や持続可能な開発における経済的、社会的、環境的な側面を統合するものである。
- 26. 世界森林目標及びターゲットは、国、国際機関、地域機関、準地域機関、非政府組織等のパートナーやステークホルダーによる自発的な取組、貢献、協力の強化を奨励するとともに、それらの枠組となることを目的としている。さらに、国連システム内やCPF加盟組織間、その他の森林関連の組織やプロセス間において、森林に関する一貫性や連携の強化のための根拠となる。
- 27. 世界森林目標及びターゲットは、それらの達成に必要とされる自発的な取組、貢献、協力等に関する多様な活動分野を含む。これらの活動分野は、UNFIに掲げられている44の政策、手段、行動を反映し、含むものである。網羅的ではないが、想定される行動分野はUNSPFの別紙に添付されるとおりである。例示される行動分野は、複数の目標に関連する場合もある。

世界森林目標 1

保護、再生、植林、再造林を含め、持続可能な森林経営を通じて、世界の森林減少を反転させるとともに、森林劣化を防止し、気候変動に対処する世界の取組に貢献するための努力を強化する。

- 1.1 全世界で森林面積を3%増加させる。
- 1.2 世界の森林の炭素蓄積を維持または増加させる。

1.3 2020年までに、あらゆるタイプの森林の持続可能な経営の実施を促進し、森林減少を阻止し、劣化した森林を回復し、世界全体で新規植林及び再造林を大幅に増加させる。

1.4 あらゆる森林の自然災害や気候変動の影響に対する強靱性や適応能力を世界全体で顕著に強化させる。

目標1及びそのターゲットは、特にSDG6.6、12.2、13.1、13.3、14.2、15.1-15.4及び15.8、愛知目標5、7、9、11、14及び15を支持し、その達成に貢献する。

世界森林目標2

森林に依存する人々の生計向上を含め、森林を基盤とする経済的、社会的、環境的な便益を強化する。

2.1 森林に依存する全ての人々の極度の貧困を撲滅する。

2.2 特に開発途上国において、森林関係の小規模企業による手頃なクレジット等の金融サービスへのアクセス並びに森林関係小規模企業のバリューチェーンや市場への統合を顕著に増加させる。

2.3 森林及び樹木による食料安全保障への貢献を顕著に増加させる。

2.4 森林関連産業、その他森林を基盤とする企業及び森林生態系サービスの社会的、経済的、環境的な開発への貢献を顕著に増加させる。

2.5 関連する条約等のマンデートや実施中の活動を考慮しつつ、あらゆるタイプの森林の生物多様性の保全や気候変動の緩和及び適応への貢献を増加させる。

目標2及びそのターゲットは、特にSDG1.1、1.4、2.4、4.4、5.a、6.6、8.3、9.3、12.2、12.5、15.6及び15.c、愛知目標4、14及び18を支持し、その達成に貢献する。

世界森林目標3

世界全体の保護された森林面積やその他の持続可能な森林経営がなされた森林の面積、持続的な経営がなされた森林から得られた林産物の比率を顕著に増加させる。

3.1 世界全体で、保護地域として指定された森林や、その他の効果的な地域指定型の保全措置により保全が図られた森林の面積を顕著に増加させる。

3.2 長期的な森林の管理経営のための計画がたてられた森林の面積を顕著に増加させる。

3.3 持続的な経営がなされた森林から得られた林産物の比率を顕著に増加させる。

目標3及びそのターゲットは、特にSDG7.2、12.2、12.6、12.7、14.2、14.5、15.2及び15.4、愛知目標7、11、12及び16を支持し、その達成に貢献する。

世界森林目標4

持続可能な森林経営の実施のための、大幅に増加された、新規や追加的な資金をあらゆる財源

から動員するとともに、科学技術分野の協力やパートナーシップを強化する。

- 4.1 持続可能な森林経営に資金を供給するため、あらゆる財源からあらゆるレベルで相当程度の資金を動員するとともに、開発途上国に対し、保全や再造林を含む持続的な経営を推進するための適正なインセンティブを提供する。
- 4.2 公的資金（国庫資金、二国間協力、多国間協力、3ヶ国協力）、民間及び慈善的な団体による融資等、あらゆる財源からの森林関連の資金供給をあらゆるレベルで大幅に増加させる。
- 4.3 森林分野における科学、技術、イノベーションに関する、南北、南南、北北及び3ヶ国間の協力や官民パートナーシップを顕著に向上・増加させる。
- 4.4 森林の資金供給戦略を策定及び実施するとともに、あらゆる財源からの資金にアクセスした国の数を顕著に増加させる。
- 4.5 例えば多くの専門分野にわたる科学的な評価を通じ、森林に関する情報の収集、利用可能性、入手可能性を向上させる。

目標 4 及びそのターゲットは、特に SDG12.a、15.7、15.a、15.b、17.1-17.3、17.6-17.7、17.16-17.19、愛知目標 19 を支持し、その達成に貢献する。

世界森林目標 5

UNFI 等を通じ、持続可能な森林経営を実施するためのガバナンスの枠組を促進するとともに、森林の 2030 アジェンダへの貢献を強化する。

- 5.1 森林を国の持続可能な開発計画及び／または貧困削減戦略に統合した国の数を大幅に増加させる。
- 5.2 国及び地方の森林セクターを顕著に強化する等、森林法の執行及びガバナンスが向上するとともに、違法伐採や関連の取引を世界中で大幅に減少させる。
- 5.3 国及び地方の森林関連の政策や計画が、各国の法令に基づき、省庁やセクター間で一貫的であり、連携が図られ、それぞれ補完的であるとともに、「先住民族の権利に関する国際連合宣言」を十分に踏まえ、関連のステークホルダー、地域社会及び先住民の参加が確保される。
- 5.4 森林に関連する課題や森林セクターが土地利用計画や開発に関する意思決定プロセスに十分に統合させる。

目標 5 及びそのターゲットは、特に SDG 1.4、2.4、5.a、15.9、15.c、16.3、16.5-16.7、16.10 及び 17.14、愛知目標 2 及び 3 を支持し、その達成に貢献する。

世界森林目標 6

国連システム内や CPF 加盟組織間、セクター間、関連のステークホルダー間等、あらゆるレベルにおいて、森林の課題に関し、協力、連携、一貫性及び相乗効果を強化する。

- 6.1 国連システム内の森林関連プログラムが一貫的かつ補完的であり、必要に応じて世界森林目標及びターゲットを統合する。
- 6.2 CPF 加盟組織間の森林関連プログラムが一貫的かつ補完的であり、それらが全体として森林及び森林セクターの 2030 アジェンダへの多面的な貢献を包含する。
- 6.3 持続可能な森林経営を推進するとともに、森林減少や森林劣化を阻止するためのセクター間の連携や協力があらゆるレベルで大幅に増加させる。
- 6.4 持続可能な森林経営の概念に関する理解がさらに共通のものとなり、関連する指標セットが定められる。
- 6.5 UNSPF の実施や、会期間活動を含む UNFF の活動において、メジャーグループやその他のステークホルダーのインプットや関与が強化される。

目標 6 及びそのターゲットは、特に 17.14 を支持し、その達成に貢献する。

III. 実施の枠組

- 28. UNSPF は、世界森林目標及びターゲットを達成するため、あらゆるレベルにおける全ての主体による意欲的かつ変化を起こす行動の根拠となる。役割及び責任、実施の手段の概要は以下のとおりである。

A. 役割及び責任

1. UNFF のメンバー

- 29. UNFF のメンバーによる個別のまたは集合的な行動や約束は、UNSPF の実施の成功や世界森林目標及びターゲットの達成にとって決定的なものである。
- 30. UNFF のメンバーは、各国の事情、政策、優先事項、能力、発展水準、森林の状況等を考慮し、任意で、世界森林目標及びターゲットの達成に向けた自身の貢献を定める。
- 31. UNFF のメンバーは、任意の国別の貢献において、アジェンダ 2030 及び SDGs、愛知目標、気候変動枠組条約の下で採択されたパリ協定に基づく気候変動対策等、他の国際的な森林関連の約束や目標への貢献を必要に応じて盛り込むことができる。
- 32. UNFF のメンバーは、UNSPF のパラ 67 に従って、UNFF により定められた定期的な頻度により、任意の国別の貢献の進捗を UNFF に任意で報告する。追加的な報告負担を避けるため、任意の国別の貢献に関する UNFF への任意の報告は、UNSPF や UNFI の任意の報告の一部とすることができる。
- 33. UNFF のメンバーは、森林関連の国際機関、地域機関、準地域機関、プロセスの運営組織のメンバーとして、必要に応じ、それらの組織のマנדートや優先事項を踏まえ、世界森林目標及びターゲットを組織の戦略等へ統合することが推奨される。

2. UNFF 及び UNFF 事務局

34. UNFF は、国連システム及び IAF の一部として、経済社会理事会決議 2015/33 に定められたその主要業務を遂行するに当たって、UNSPF に即して活動することとする。UNFF の 4 カ年活動計画（the quadrennial programme of work : 以下、「4POW」という。）は、当該 4 年間に於ける世界森林目標及びターゲットへの貢献を反映させることとする。
35. UNFF は、CPF へのガイダンスの提供や奇数年及び偶数年の年次会合の間の円滑な相互関係を確実にすること等により、UNSPF の実施のフォローアップ及び評価に責任を有する政府間組織である。
36. UNFF 事務局は、4POW 及び UNSPF に関連するあらゆる事項について、事務局機能を提供し、活動を支える。
37. セクター横断的な連携を発展させ、国連内外の相乗効果を高めるなど、4POW の下での活動の影響や妥当性を最大化することを目的として、UNFF の年次会合を構成するとともに、会期間の活動を強化することとする。

3. CPF 及びその加盟組織

38. CPF の加盟組織は、UNSPF の実施において重要な役割を有しており、適宜、それぞれのマンドレートに応じて、関連する世界森林目標及びターゲットを自らの森林関連計画等に統合することが奨励される。
39. CPF は、世界森林目標及びターゲットの達成に当たって、その加盟組織間の協力やパートナーシップ、4POW に即した共同の作業計画の実施、全てのまたは一部の加盟組織による共同活動や資金ニーズの把握等を通じ、UNFF 及びそのメンバーによる世界森林目標及びターゲットの推進を支援することが求められる。
40. UNFF のメンバーは、CPF 加盟組織間の協力、相乗効果、一貫性の向上に不可欠な戦略として、CPF 作業計画を支援することが奨励される。また、CPF 及びその加盟組織の活動を支援するため、任意で財政支援を提供することが奨励される。

4. 国連システム

41. CPF に未加盟の国連機関、組織、国連専門機関の中には、あらゆる形態の貧困の撲滅、男女の平等、女性の社会的地位の向上、労働基準、中小企業、科学技術協力、防災、エコツーリズム等の森林に関連する課題や、「先住民族の権利に関する国際連合宣言」に関する課題等に取り組むものがある。これらの機関、組織、国連専門機関は、それらのマンドレートの範囲において、世界森林目標及びターゲットが、それぞれの機関等の SDGs の達成への貢献を含む政策やプログラムと相乗効果を高められるよう、UNSPF を参照文書として活用することが求められる。
42. リオ条約の事務局及びその締約国との緊密な協力並びにそれぞれの森林に関連する目的に係る相互支援的な取組は、世界森林目標及びターゲットの達成にとって重要である。

43. 国連システム事務局長調整委員会も、必要に応じ、国連システム内で、森林に関連する活動の参照文書として UNSPF の活用を促進することが招請される。

5. その他の政府間パートナー及び国際レベルのステークホルダー

44. CPF に代表される多国間環境協定に加え、湿地に関するラムサール条約、絶滅のおそれのある野生動植物の種の国際取引に関する条約、世界遺産条約等、その他多くの多国間環境協定の下で森林に関する活動が実施されており、世界森林目標及びターゲットへの重要な貢献を行うことができる。これら協定の事務局及び締約国は、必要に応じ、それぞれのマンデートに即し、UNSPF の実施に貢献する機会を追求することが求められる。

6. 地域機関、準地域機関及びプロセス

45. 国連地域経済委員会、FAO 地域林業委員会をはじめとする地域機関、その他の地域機関、準地域機関及びプロセスは、国際的な政策及び国の活動との間の重要な架け橋となるとともに、UNSPF を実施し、その世界森林目標及びターゲットを達成するための取組において、重要なパートナーでもある。
46. UNFF は、地域機関、準地域機関及びプロセスとともに、地域内外において、情報の交換、連携の強化、普及啓発、ステークホルダーの関与の強化、優良事例の拡大に向けた能力開発等を奨励することを通じ、世界森林目標及びターゲットに貢献するための方法を特定する。
47. 地域機関、準地域機関及びプロセスは、国連システム内の組織や基準・指標プロセスも含め、SDGs の実施に貢献する観点から、UNSPF とそれぞれの政策やプログラムの間の相乗効果を確立し、強化するよう奨励される。
48. メンバーは、UNSPF を推進するため、地域及び準地域レベルの森林政策の立案、対話及び連携の強化を検討するよう求められる。

7. メジャーグループ及びその他のステークホルダー

49. 持続可能な森林経営の効果的な実施は、森林所有者、先住民や地域社会、地方自治体、民間セクター（中小及び大規模な森林関連企業等）、非政府組織、女性、子どもや若者に加え、科学的、学術的な団体や慈善団体等のあらゆるステークホルダーのあらゆるレベルでの貢献に依存している。
50. UNFF は、メジャーグループその他のステークホルダーが、あらゆるレベルにおいて、世界森林目標及びターゲットの達成に向けた自らの貢献を高めるとともに、認識の向上、情報の交換や普及の取組の強化、協調してアイデア等を提供する取組の促進等を目指すネットワーク、アドバイザリーグループその他の枠組に参加し、UNFF や CPF との交流を強化するための方法を定めるため、メジャーグループその他のステークホルダーとの協力に努める。

51. メジャーグループ及び民間の慈善団体、教育や学術団体、ボランティアグループ等の関連するステークホルダーは、UNFFや森林に関連する国連機関への関与や参加を確保するため、あらゆるレベルでの効果的な連携の枠組を自ら構築し、維持するよう奨励される。

B. 実施の手段

52. 2030 アジェンダの根幹であるアディスアベバ行動目標に基づき、UNSPF は、あらゆるレベルにおける、効果的な制度、良好な政策、法的枠組、よいガバナンスやパートナーシップ等により支えられた、森林に関する資金供給や能力開発等、国際協力や実施の手段のための基本を提供する。世界森林目標及びターゲットの達成に向けた行動に必要な資金ニーズの全てに応える唯一の解決策は存在しないことを認識した上で、公共部門や民間部門の資金、国際資金、二国間や多国間の資金等、あらゆるステークホルダーによるあらゆる資金源からのリソースをあらゆるレベルで動員するための行動を組み合わせることが必要である。
53. SDGs の目標 17 及び各 SDGs の下に掲げられた実施手段に関するターゲットは、2030 アジェンダを実現するための重要な鍵であり、その他の目標やターゲットと同様に重要なものである。再生された持続可能な開発のためのグローバルパートナーシップが、アディスアベバ行動目標に示された具体的な政策や行動に支えられることにより、SDGs を含む 2030 アジェンダの達成が可能となる。2030 アジェンダの根幹であるアディスアベバ行動目標の国連総会での承認を歓迎するとともに、行動目標の着実な実施こそが、SDGs 及びそのターゲットの実現に不可欠であることが認識されるべきである。
54. あらゆる資金源からの新規や追加的な財源を含む資金源が、あらゆるレベルにおいて動員され、効果的に利用されることは、きわめて重要である。国のオーナーシップ及びリーダーシップの原則に裏付けられた、公共の政策、国内の財源の動員及びその効果的な利用は、我々が共通して追求する持続可能な開発の中核をなすものである。
55. 民間企業の事業活動、投資やイノベーションは、生産性、包摂的な経済成長、雇用創出の主要なエンジンであり、民間企業の国際的な資本の流れ、特に海外直接投資は、安定した国際的なシステムとあいまって、国の開発努力を補完する重要な要因である。
56. 国際公共財政は、各国が国内で公的資金を動員する取組を補完する上で重要な役割を果たすものであり、最大のニーズを抱えつつ、その他の資金を動員する能力が最も劣る国にとって、それは特に重要なものとなる。政府開発援助を含む国際公共財政の重要な効用は、その他の財源や官民の資金源に対し、追加的な資源動員を促すことである。
57. 慈善団体や財団も、官民パートナーシップ及び多様なステークホルダーのパートナーシップと同様、持続可能な森林経営や UNSPF の実施のためのリソースの拡充を図る上で重要な役割を有している。
58. 世界森林目標及びターゲットを推進するに当たって、メンバーは以下の取組を奨励される。

- (a) 科学、技術及びイノベーションに関する、南北、南南、3ヶ国間の地域協力及び国際協力を推進し、それらの分野へのアクセスを向上させるとともに、特に国連レベルでの既存のメカニズム間の連携の強化や、世界レベルでの技術促進メカニズム等を通じ、相互に合意する条件での知見の共有を促進すること。
 - (b) 相互に同意された譲許的優遇的な条件で開発途上国に対して行われる環境に優しい技術の開発、移転、普及を促進すること。
 - (c) 国連システムのプログラム、基金や専門機関、国レベルの基金、国内財源、民間資金に加え、国レベル、地域レベル、準地域レベルの開発銀行や融資機関、二国間開発援助機関、財団や慈善団体から提供される融資の機会等を通じて、無償資金、譲許的有償資金及び革新的な資金を充分利用すること。
59. 以下に掲げる活動の有資格国は、その取組を通じて、利用可能な国際的な資金を十分活用することが奨励される。
- (a) 地球環境ファシリティ（Global Environmental Facility：以下、「GEF」という。）の持続可能な森林経営戦略及びリオ条約の資金メカニズムとしての GEF の事業対象分野（生物多様性、気候変動、土地劣化）
 - (b) 環境と開発の目標を統合するに当たって、持続可能な森林経営の多面的な役割を強化するため、GEF の事業対象分野間の相乗効果が発揮できる特性を踏まえた、GEF の増資過程における持続可能な森林経営のための戦略及び融資
 - (c) UN-REDD プログラム、森林炭素パートナーシップ基金や森林投資プログラムの下での活動及び緑の気候基金
60. メンバーは、生態系サービスへの支払い等の革新的な資金メカニズムの潜在的な可能性や、気候変動枠組条約の下での既存の資金メカニズムを十分活用することが奨励される。
61. 世界森林目標及びターゲットを効果的に達成するには、利用可能な最高の科学的及び伝統的な森林関連の知識の動員を必要とする。科学コミュニティは、UNFF 及びそのメンバーと協力し、UNFF に科学的なインプットを行うこと等によって、UNSPF の実施を支援することが奨励される。その際、UNFF は、CPF による既存の共同イニシアチブを基本としつつ、さらにそれらの取組を強化することが要請される。

1. GFFFN

62. UNFF の GFFFN は、CPF 加盟組織との緊密な連携により、各国が UNSPF の実施及び世界森林目標及びターゲットの達成を図るために資金源へのアクセスを促進することで、持続可能な森林経営の取組拡大に貢献する。このため、GFFFN が優先的にすべきことは以下のとおりである。
- (a) メンバーが、国家森林プログラムまたはその他の適切な国の枠組等において、既存の各国の政策を含む持続可能な森林経営のための資金の動員に向けた国家森林資金戦略を立案することを促し、支援すること。

- (b) 各国が自らの政策や戦略を踏まえ、持続可能な森林経営のための既存のあらゆる種類の財源を動員し、それらの資金にアクセスし、効果的に利用できるよう、支援を行うこと。
 - (c) CPF が整備した森林資金に関するオンライン・ソースブックに基づき、既存の資金、新規の資金及び新興の資金の獲得機会に関する情報を提供するクリアリング・ハウス及びデータベースとして機能するとともに、成功したプロジェクトから得られた教訓や優良事例を共有するツールとして機能すること。
 - (d) 世界森林目標及びターゲット及び 4POW に掲げられた優先事項の達成に貢献すること。
63. 資金へのアクセスに際して、アフリカ、後発開発途上国、低森林被覆国、高森林被覆国、中規模森林被覆で森林減少が少ない諸国、小島嶼開発途上国、経済移行国等に特有のニーズや状況に対し、特別の配慮がなされる必要がある。

2. UNFF 信託基金

64. UNFF 信託基金は、任意の拠出金を財源として、UNFF を支援する活動に助成する目的で 2001 年に設立された。信託基金は GFFFN の活動にも充てられる。メンバーは、信託基金に任意拠出を提供することが奨励される。
65. UNFF は、信託基金の積立規模を含め、GFFFN の活動内容や業績を定期的に監視及び評価する。

IV. 評価の枠組

A. IAF の評価

66. 国連経済社会理事会決議 2015/33 の第 12 章に基づき、UNFF は、IAF がその目的の達成に有効であったかを検証する中間評価を 2024 年に実施し、最終評価を 2030 年に実施することとされている。中間評価においては、以下の事項を考慮することとする。
- (a) あらゆるタイプの森林に関する法的拘束力のある文書の採択、現行の枠組の強化、現行の枠組みの継続等の幅広いオプション
 - (b) 資金調達の幅広いオプション、特に、あらゆるタイプの森林の持続可能な経営を支援するためのあらゆる資金源からの資金を動員する任意の世界森林基金の創設。このことは、仮に合意が得られれば、2024 年よりも早い UNFF 会合において、さらに検討されうる。

B. UNSPF の進捗

67. UNFF は、2024 年及び 2030 年にそれぞれ実施する IAF の有効性に係る中間評価及び最終評価において、UNSPF の進捗を評価する。当該評価は、世界森林目標及びターゲットに関連のある SDGs 指標等の国際的に合意された指標に基づいて行われる。

68. 当該評価は、UNSPF、UNFI 及び任意の国別の貢献の実施状況に関する任意の国別報告、直近の世界森林資源評価（Global Forest Resources Assessment：以下、「FRA」という。）の結果並びに CPF 及びその加盟組織、地域機関、準地域機関その他関連のステークホルダー等、国連システムの内外に存在するその他のパートナーからのインプットを考慮して行うものとする。
69. 報告負担を軽減するため、UNFF は、FAO の FRA や SDGs の地球規模での評価サイクルを考慮し、メンバーによる任意の国別報告のサイクルやフォーマットを定めることとされている。

C. 2030 アジェンダのフォローアップ及び評価への貢献

70. UNFF は、経済社会理事会の機能委員会として、CPF の世界森林指標に関する取組に加え、持続可能な開発に関するハイレベル政治フォーラム（the high level political forum：以下、「HLFP」という。）の年次会合において詳細な評価が行われる SDGs に対する森林分野の貢献を十分説明すること等により、2030 アジェンダのフォローアップ及び評価に貢献するべきである。

V. 広報及び普及戦略

71. 広報及び普及は、UNSPF に欠かせない重要な要素であり、それ自体が重要な広報手段でもある。広報及び普及戦略は、森林セクターの内外を問わず、あらゆるタイプの森林や樹木による地球上の生命及び人類への不可欠な貢献について認識を高めるために策定される必要がある。広報及び普及戦略は、UNSPF を活用し、4POW に即し、HLFP に関連するテーマ等を考慮するものである。あらゆるレベルの主体がこれらの取組に貢献することが奨励される。
72. 広報戦略は、グラフィックな視覚化等により、UNSPF に関する認識を高めるものとする。
73. UNFF は UNSPF のための広報及び普及戦略を策定する。当該戦略は、特にターゲット層、主要なメッセージ、手段、活動及び成功基準を定める。
74. 国連システム、CPF 及びその加盟組織、その他のパートナーは、自らが発するメッセージの影響力を高めるため、森林に関連する広報や普及に関して、連携や相乗効果を高めるとともに、国、地域、準地域及び非政府の組織やプロセスと共同でのイベントの実施や出版物の発行等を検討することが奨励される。
75. 3月21日の国際森林デーは、UNSPF の実施を推進するための強力な年次イベントとなるとともに、あらゆるレベルで森林に関わる全ての主体によって、個別及び共同で行う普及活動のプラットフォームとなる。メンバーは、国際森林デーを他の関連のステークホルダーとともに祝い、その活動内容を UNFF に報告することが奨励される。

[別添]

UNSPF の世界森林目標及びターゲットに関連する行動分野（網羅的ではなく、記載順も不同）

世界森林目標 1

保護、再生、植林、再造林を含め、持続可能な森林経営を通じて、世界の森林減少を反転させるとともに、森林劣化を防止し、気候変動に対処する世界の取組に貢献するための努力を強化する。

- (a) 森林減少の削減・抑止
- (b) 森林劣化の削減・抑止
- (c) 森林の健全性の維持・向上
- (d) 再造林、新規植林
- (e) 森林ランドスケープの再生・回復
- (f) 天然更新
- (g) 森林の気候変動の緩和及び適応への貢献
- (h) 森林の生物多様性の損失の削減・抑止
- (i) 侵略性外来種の影響の緩和
- (j) 大気汚染の影響の緩和
- (k) 火災のコントロール及び管理
- (l) 土地劣化及び砂漠化の防止における森林の役割
- (m) 砂塵嵐及び砂嵐への対処
- (n) 野生生物の保護管理
- (o) 天然林及び人工林の持続可能な経営に向けた革新的アプローチ
- (p) 災害リスクの軽減
- (q) 森林内及び近隣における鉱業活動の管理
- (r) 大気、水質、土壌の汚染の影響の緩和
- (s) 天然林及び人工林を含む森林の持続可能な経営に向けた革新的アプローチ

世界森林目標 2

森林に依存する人々の生計向上を含め、森林を基盤とする経済的、社会的、環境的な便益を強化する。

- (a) 森林の貧困削減及び生計への貢献
- (b) コミュニティ・共同型の森林管理
- (c) 林産物の生産及び加工における付加価値向上
- (d) 林業労働者の雇用条件及び賃金
- (e) 林産物の競争力強化及び多様化
- (f) 森林の財及びサービスの評価
- (g) 生態系サービスに対する支払い
- (h) 森林の保護機能（土壌及び水の管理）
- (i) 森林及び森林以外の樹木の遺伝的多様性の保全及び持続可能な利用
- (j) 伝統的な森林に関連する知識
- (k) 森林に関連する教育、研修及び普及
- (l) 都市化の文脈における森林及び樹木
- (m) 林産物の持続可能な生産及び消費
- (n) 森林の社会経済的機能
- (o) エコツーリズムの開発
- (p) 異なる森林タイプの重要性及び特徴（冷温帯林、温帯林、熱帯林等）
- (q) アグロフォレストリー
- (r) 研究
- (s) 新たな／革新的な林産物
- (t) 持続可能な森林経営における女性及び少女の役割
- (u) 持続可能な建築物資材

世界森林目標 3

世界全体の保護された森林面積やその他の持続可能な森林経営がなされた森林の面積、持続的な経営がなされた森林から得られた林産物の比率を顕著に増加させる。

- (a) 保護された森林地域及びネットワークの管理
- (b) 適切な場合には国立公園の設置、拡大等も含め、その他の効果的な区域指定型の保全措置等による保全の強化
- (c) 生産林を含む森林の生物多様性の保全及び持続可能な利用

- (d) 木材及び特用林産物の生産のために利用される森林の持続可能な経営
- (e) 森林の生産機能
- (f) 木質バイオマスの持続可能な利用を含むエネルギー及び薪炭材のための木材
- (g) 持続可能な経営がなされた森林に由来する林産物の競争力
- (h) 市場を基盤としたツール
- (i) 持続可能な森林経営及びその他の公共政策ツールのためのインセンティブ
- (j) 林産物の合法性証明及びトレーサビリティ
- (k) 影響が低減された伐採へのアプローチ
- (l) 面的広がりがある土地利用計画ツールの適用
- (m) 持続可能な森林経営における先住民及び地域コミュニティの役割
- (n) 持続可能な経営がなされた森林に由来する林産物の生産及び消費を促進するための建築物市場及びインフラ
- (o) 森林の生物多様性の保全及び持続可能な利用

世界森林目標 4

持続可能な森林経営の実施のための、大幅に増加された、新規や追加的な資金をあらゆる財源から動員するとともに、科学技術分野の協力やパートナーシップを強化する。

- (a) 持続可能な森林経営を達成するための実施の手段
- (b) UNFI の実施に向けた財政支援
- (c) 国際公共財性及び各国の政府予算
- (d) 持続可能な森林経営及び森林関連企業に対する海外及び国内の民間セクター投資
- (e) 持続可能な森林経営のための資金にアクセスし、動員するための能力開発
- (f) 開発途上国における能力開発を拡大するための専門性
- (g) 公共・民間パートナーシップ
- (h) 環境に優しく、革新的な森林関連技術及びノウハウ
- (i) 北南、南南及び3カ国の技術及び科学協力
- (j) 北北の技術及び科学協力
- (k) 森林関連企業の生産性
- (l) 森林の科学及び政策のインターフェース

- (m) 優良事例及び革新的ツール
- (n) 地域及び準地域の資金供給の財源及びメカニズム
- (o) UNFI 及び UNSPF の実施のためのプログラム及びパイロット事業

世界森林目標 5

UNFI 等を通じ、持続可能な森林経営を実施するためのガバナンスの枠組を促進するとともに、森林の 2030 アジェンダへの貢献を強化する。

- (a) あらゆるレベルにおける分野横断的な連携
- (b) 森林の価値を国の計画及び会計に統合
- (c) 持続可能な森林経営への投資のための環境整備
- (d) 森林法の施行、ガバナンス及び貿易
- (e) 違法伐採及び関連の取引
- (f) 森林の土地の保有権及び土地所有制度
- (g) 女性及び少女の地位向上を含む森林セクターにおけるジェンダーの平等
- (h) あらゆるレベルにおけるステークホルダーの参加
- (i) 森林の意志決定における市民参加
- (j) 市民社会のパートナーシップ
- (k) 持続可能な森林経営における研究の役割
- (l) 持続可能な森林経営のための基準・指標
- (m) 森林インベントリー及び信頼できる森林データ及び統計の利用可能性
- (n) 国家森林インベントリー及び他の公的な森林関連データ
- (o) 持続可能な森林経営のための法的な政策及び制度的な枠組

世界森林目標 6

国連システム内や CPF 加盟組織間、セクター間、関連のステークホルダー間等、あらゆるレベルにおいて、森林の課題に関し、協力、連携、一貫性及び相乗効果を強化する。

- (a) 世界規模の森林ガバナンスにおける一貫性の向上、分断の減少
- (b) 森林関連のプログラム及び政策間の一貫性、連携及び協力
- (c) CPF の共同政策及び共同事業計画

- (d) UNFF のメンバー、CPF、地域及び準地域の機関及びプロセス、メジャーグループ及びその他非政府のステークホルダーによる連携及び協力
- (e) あらゆるレベルにおける活動計画の調和
- (f) データ収集並びに報告のサイクル及びフォーマットの強化及び調和
- (g) 基準・指標プロセス間の協調メカニズム
- (h) 持続可能な森林経営に関する共通理解
- (i) 地域及び準地域の連携メカニズム

Forest Investor Club

2023 Annual Report



World Business
Council
for Sustainable
Development

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Executive *Summary*



Executive Summary

The U.S. Department of State formed the Forest Investor Club (FIC), a network of leading public and private financial institutions, companies and other investors in forests and nature, in November 2021 as part of its broader USD \$9 billion commitment to conserve and restore forests and other natural ecosystems.¹

Recognizing the immense value that natural capital provides in supporting the health and livelihoods of communities and economies around the world and the potential for nature-based solutions (NbS) to address global systemic risks linked to climate change, biodiversity loss and land degradation, **FIC and its members are committed to accelerating the deployment of capital into the protection, restoration and sustainable management of forests and nature.**

FIC aims to address traditional barriers to scaling NbS investments in emerging and frontier markets in particular. To do so, it is facilitating new partnerships and collaboration among its members and with other partners, such as catalytic capital providers and companies. FIC also identifies new potential investable opportunities, promotes pre-competitive knowledge sharing and solutions and showcases and amplifies innovative investment strategies, partnerships and best practices.

The U.S. Department of State selected the World Business Council for Sustainable Development (WBCSD) to lead the FIC Secretariat in late 2022. **As the Secretariat, WBCSD convenes and supports FIC members by fostering pre-competitive collaboration, developing solutions to overcome investment barriers, facilitating novel partnerships and identifying pipelines for new investments.** In 2023, we developed and adopted a strategy and action program informed by evaluating current barriers to scaling NbS investments, consulting with members and conducting a landscape assessment of multi-stakeholder initiatives with similar objectives. This has culminated in a Theory of Change (see Figure 1) targeting those barriers we are in a position to address and that would be complementary to other initiatives.

Through this work, **we identified a number of barriers hindering greater investment in NbS.** These are related to market readiness, investor capacity, pipeline development, commercial considerations, clear and consistent standards, methodologies, data and metrics and the broader enabling environment. While we cannot address all of these barriers, we aim to facilitate new partnerships and collaboration to improve risk-return profiles and other commercial considerations of NbS investments, identify new potential investable opportunities, build capacity and understanding on best practices for investment in nature markets and foster knowledge sharing by showcasing innovative investment strategies.

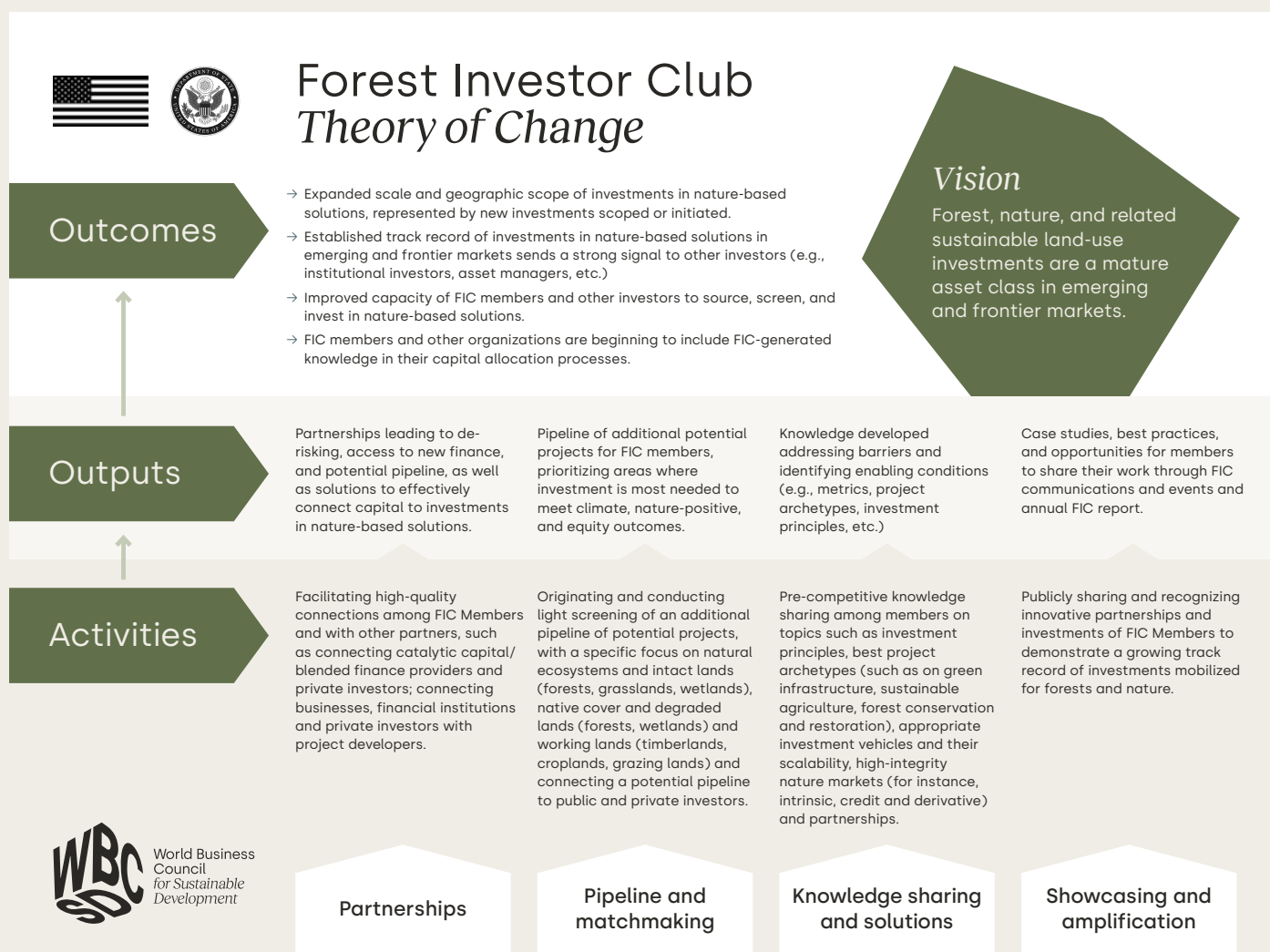


In assessing the landscape of initiatives with similar objectives to support greater NbS investment, we identified that **17 of 64 initiatives analyzed share four key characteristics – a focus on solutions to traditional investment barriers, new partnership facilitation, the development of a pipeline of investment opportunities and being multi-stakeholder in nature.** While these four key characteristics also define FIC, further analysis demonstrated that each of these initiatives and FIC differ in terms of the degree of emphasis placed on each of the characteristics, the types of members and stakeholders represented, the approach to partnerships and their geographic and sectoral focus within the range of NbS.

Most importantly, the analysis revealed that the landscape is ripe for collaboration. Among the initiatives we identified, there are complementary strengths, resources and networks to leverage and **an “all hands” approach will be necessary to meet ambitious goals for scaling NbS investments to address global challenges.**

While we have formalized our strategy, governance and approach, our members are already developing and executing innovative investment strategies to drive capital into high-impact forestry and other NbS projects. **In this inaugural FIC Annual Report, we are pleased to share seven case studies featuring FIC members – the Apple Restore Fund, BTG Pactual Timberland Investment Group (TIG) Latin America Reforestation Strategy, Conservation International (CI) Ventures, the Lombard Odier Investment Managers (LOIM) New Food Systems Strategy, the Mirova Land Degradation Neutrality (LDN) Fund, the New Forests African Forestry Impact Platform (AFIP) and the &Green Fund advised by SAIL Ventures.** These case studies demonstrate novel approaches, innovative partnerships and best practices that can help inform how NbS investment strategies can scale in size, pace and global reach.

Figure 1: Forest Investor Club Theory of Change



Introduction



01.

01. Introduction

Forests and other ecosystems provide immense value to the global economy, as an estimated 55% of the world's GDP depends moderately or highly on nature and ecosystem services broadly,² while nearly a quarter of people around the world rely on forests for their subsistence needs, livelihoods, employment and income.³ As of 2021, estimates put the annual value of traded goods and services generated by nature markets at USD \$9.8 trillion per year,⁴ which likely represents a small fraction of their full value.⁵

Beyond the direct role that natural capital plays in supporting life and local and global economies, nature-based solutions (NbS) offer readily available pathways to address long-term systemic challenges related to climate, nature and equity that pose material human and economic risks. Global temperatures continue to rise – the Intergovernmental Panel on Climate Change (IPCC) estimates that the average global surface temperature has already increased by 1.1°C from pre-industrial levels.⁸ July 2023 was the hottest month on record.⁹ Wildlife populations globally decreased by 69% from 1970-2018 and may experience even more loss under a warming climate,¹⁰ while a third of the world's forests have already been lost.¹¹

NbS have the potential to help address many of these challenges. For example, it's estimated that NbS could provide 37% of the cost-effective climate change mitigation efforts needed by 2030 to meet Paris Agreement goals and stabilize warming below 2°C.¹² Existing forests are home to roughly 80% of the world's terrestrial biodiversity.¹³ By protecting, restoring and sustainably managing these and other ecosystems, NbS can help mitigate global biodiversity loss.

At the same time, investments in forests and other NbS also represent a substantial market opportunity. All told investments in nature could generate over USD \$3.6 trillion in annual business opportunities and 191 million jobs by 2030.¹⁴ Data show the forestry and logging market will grow by 6.3% annually to reach USD \$438.5 billion by 2026.¹⁵ And projections indicate demand for primary processed wood products will increase by 37% between 2020 and 2050.¹⁶ NbS have the potential to fill this demand through more sustainable and regenerative practices. In addition to more traditional forestry and agriculture markets, market opportunities for environmental services provided by NbS continue to mature and emerge. Some projections of the carbon credit market (both compliance and voluntary) estimate potential growth of 31% annually to reach USD \$4.4 trillion in 2031.¹⁷ Nascent approaches to valuing and monetizing biodiversity are also beginning to evolve.

As recognition of the long-term value of natural capital from an economic, environmental and societal perspective has grown and as opportunities in carbon and other environmental markets from NbS continue to mature, annual financial flows into nature from public and – in particular – private sources have increased in recent years. Total global investment in the world's terrestrial and marine ecosystems amounted to an estimated USD \$154 billion in 2022, representing 2.6% growth from 2021. Most of that growth came from the private sector – while private sector investment represented 17% of total nature investment in 2022, it experienced 9.9% growth from 2021,¹⁸ much of it driven by the growing carbon market.

What is natural capital?

The stock of renewable and non-renewable natural resources (e.g., plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people.⁶

What are nature-based solutions (NbS)?

Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.⁷

Despite these promising trends, there is still a significant financing gap. It's estimated that to realize the full potential of nature to limit climate change to below 1.5°C warming, halt biodiversity loss and achieve land degradation neutrality in necessary timeframes, total global investment into NbS would need to more than double by 2025 – to USD \$384 billion per year – and rise to USD \$484 billion per year by 2030.¹⁹ All in all, there is an estimated USD \$11 trillion total financing need between 2022 and 2050 for NbS to meet ambitious climate change, biodiversity and land degradation targets.²⁰

Seeing the need for such a transformational change, the U.S. Department of State announced the formation of the Forest Investor Club (FIC) in November 2021 at the World Leaders Summit Forest Day during the United Nations Climate Change Conference (COP26) in Glasgow.²¹ This was part of its broader USD \$9 billion commitment to conserve and restore forests and other natural ecosystems.²² FIC is a network of leading public and private financial institutions, companies and other investors committed to accelerating the deployment of capital into the protection, restoration and sustainable management of forests and nature.

The State Department selected the [World Business Council for Sustainable Development \(WBCSD\)](#) to lead the FIC Secretariat in late 2022. WBCSD is a CEO-led community of over 200 of the world's leading sustainable businesses working collectively to accelerate the system transformations needed for a net-zero, nature positive and more equitable future. As the Secretariat, WBCSD convenes and supports FIC members by fostering pre-competitive collaboration, developing solutions to overcome investment barriers, facilitating novel partnerships and identifying pipelines for new investments. FIC focuses its efforts specifically on scaling up investments in NbS in emerging and frontier markets. These markets are often home to some of the greatest sources of natural capital, yet face underinvestment and greater barriers to attracting additional private capital.

In this first Annual Report for FIC, we assess barriers to scaling investment in forests and nature, introduce the Forest Investor Club and its Theory of Change to address some of these barriers, describe how it fits within the broader landscape of initiatives also working on solutions and share its progress to date and case studies that showcase examples of innovative investment strategies members are already undertaking.



Barriers hindering *investment in nature-based solutions*



02.

02. Barriers hindering investment in nature-based solutions

Despite the clear urgency and growing market and impact opportunity, investment in forests and nature, particularly in emerging and frontier markets, remains relatively nascent. A variety of barriers hinder the mobilization of more investors and capital into these markets – related to the market, investor capacity, pipeline development and access to finance and standards, methodologies, data and metrics. We identified the barriers in the report by reviewing recent research and conducting interviews with FIC members on their current challenges.

While we cannot address all these barriers, it is useful to understand the full context impacting greater investment globally in the protection, restoration and sustainable management of forests and nature to help achieve climate, nature and equity goals.

Markets

Fragmented ownership

A critical barrier to investment in NbS, particularly in the forestry sector in emerging and frontier markets, is the fragmented ownership and small size of properties. Private forests, specifically those that are small-scale and often characterized by insecure land tenure, offer a prime example. While much of the opportunity for new NbS investments occurs in private forests (vs. state-owned forests), the fragmentation of small-scale forests tends to lead to inefficient management (higher harvesting and transaction costs), a lack of incentives to invest in sustainable forestry and difficulties to adequately manage and monitor ecosystem services such as water, carbon, soil health, wildlife and recreational opportunities. As a result, many investors (asset owners, asset managers and businesses) seek opportunities in large-scale forests that can generate higher risk-adjusted returns and greater net-emissions reductions and sustainability gains in their supply chains. But these larger-scale and aggregated parcels are not as prevalent and may be harder to find or access.²³

In addition, local stakeholders who can play a critical role in the successful management of NbS projects often do not hold the legal rights and governance mechanisms to effectively participate. For instance, Indigenous and local communities occupy approximately 50% of the world's forests but have legal rights to about 10% of these lands.²⁴ Their lack of secure land tenure and participation in decision making inhibits the efficiency of transactions for investments on customarily-held land. We support the need for local and Indigenous communities to hold the rights to their land to ensure NbS investments are efficient and equitable.

Underdeveloped nature markets

While some markets that NbS can operate in, such as for carbon credits or agricultural and forestry commodities, are already maturing or mature, other markets that could potentially provide sources of revenues for and incentivize greater investment in NbS are still underdeveloped. One prime example is that of biodiversity credits. The increased visibility in recent years of the importance of biodiversity in national policy, international cooperation and corporate sustainability has led to a surge in activity on biodiversity credits, including the development of different definitions and taxonomies, measurement and certification schemes, trading pilots, national policy and regulatory developments, as well as early attempts to link credits to other financing instruments and initiatives.²⁵

Despite this surge of interest and activity, there is currently a lack of consolidated standards and approaches for biodiversity. There exists a wide range in methodologies, market approaches, definitions and categories of biodiversity credits, from biodiversity-linked carbon credits to philanthropic, insetting and beyond-value-chain biodiversity claims, to national mandatory offset schemes. Further, while there has been rapid growth in measurement tools, particularly driven by technology solutions such as those based on environmental DNA, bioacoustics, camera traps and remote satellite technology, the biodiversity market lacks a commonly agreed upon unit of measurement.²⁶

Demand for biodiversity credits is also still fairly tentative at this stage. Estimates shows that government-regulated biodiversity offset schemes (which includes wetland and stream mitigation banking) were mobilizing USD \$6-9 billion globally as of 2020.²⁷ But voluntary funding committed to biodiversity credit schemes has amounted to as little as USD \$8 million as of May 2023.²⁸ While biodiversity is moving up corporate agendas,²⁹ only 29.5% of companies in the S&P Europe 350 index, 12.8% in the S&P Asia Pacific LargeMidCap and 7.2% in the S&P 500 had set biodiversity targets as of November 2022.³⁰ Other challenges for biodiversity credits include the need for more robust governance, concerns of quantity and quality of supply and equitable share of compensation for local and Indigenous communities.

Together, these challenges underpin the current immaturity of the market for biodiversity credits and the significant barriers toward investment in NbS strategies centered on them. While this is not surprising given the market's early stage, it exemplifies the fact that more nascent nature markets will require significant maturation before they can invite investment at scale. Recognizing this, efforts are underway to help address some of the challenges described for biodiversity credits.³¹

Capacity

Limited experience with nature-based solutions

Many investors recognize the need for greater support for nature. For example, one study has found that 94% of asset owners and managers surveyed were somewhat (10%) or very (84%) concerned about biodiversity loss in general. And 86% were somewhat (46%) or very (40%) concerned specifically about the impact of biodiversity loss on financial markets. More than half believed that biodiversity will be one of the most important topics in the investment community by 2030.³²

While the concern and understanding are there, many investors also often cite a lack of knowledge, data and institutional experience to properly conduct due diligence on and pursue more nature-positive investment strategies.^{33,34} Some investors and businesses have limited experience in assessing nature- and climate-related risks. Many also lack dedicated investment teams, products and instruments for nature, as well as data to evaluate and monitor nature-based investments and experience navigating uncertain policy frameworks and potential reputational risks. The limited experience of some investors and businesses in the operationalization of nature markets, due to a lack of standard investment structures and the need for more robust valuation methods, often leads to the perception of high risk and potentially low returns.

At the same time, many project developers – particularly for more innovative project types in less established nature-based markets, or for more established types of projects but in geographies with a limited track record and market infrastructure – may not have the expertise or technical capabilities to effectively communicate their business models to investors, demonstrate bankability and identify and address risks. Future efforts should aim to help strengthen the relationship between investors and project developers. They should also aim to provide training and capacity for investors to fully capitalize on nature-based opportunities, identify and select projects and manage risks and dependencies, and for project developers to improve the bankability of and better communicate their business models.

Commercial considerations

Small deals and high transaction costs

According to recent research, access to large-scale investments (of more than USD \$50 million) in NbS continues to be the main challenge to attract asset owners, managers and intermediaries, including banks.³⁵ A survey of global financing vehicles focused on nature specifically (excluding those primarily driven by carbon or other strategies) revealed that the majority of ticket sizes were relatively small, requiring USD \$10 million or less, with many between USD \$100,000 and USD \$5 million. This type of deal is too small for institutional investors, who require larger ticket sizes, and even for most asset managers. Notably, however, 46% of the nature financing vehicles reviewed that disclosed either their total fund size or total mobilized capital did not provide additional detail on the ticket sizes of their respective investments. Many also did not include information on average ticket sizes or insights into geographical/sectoral distribution, revealing the need for greater transparency and disclosure to successfully understand and address needs in developing the sector.³⁶

In addition, the transaction costs associated with NbS projects are quite high, given the lack of standardization in the preparation, execution and documentation of projects and small ticket sizes associated with many NbS opportunities. Data availability challenges and novel business models or markets can also increase costs for investors to conduct due diligence, while project developers may require significant resources to enable investment readiness. These high transaction costs often result in potentially lower returns for investors, particularly for smaller-scale NbS projects.

Long production/rotation cycles

While some NbS investments can generate attractive and faster returns (such as cocoa-agroforestry), many others face long production cycles and may take 5 to 20 years for the quality and quantity of the underlying natural capital assets to improve significantly and start generating positive cash flows. Because of this, it is difficult for more traditional structures, like a 10-year private equity fund for example, to be well-suited for NbS. Raising debt finance can be even more challenging, with payback periods often far too short for the needs of an NbS project. Available interest rates and local currency risks can compound such challenges. Therefore, patient capital may be required for projects or investments with long break even times.

Low revenues

Commercial NbS projects in emerging and frontier markets tend to generate revenues from commodities (such as food, timber, etc.) alone or both commodities and ecosystem services (for example, carbon). Regardless of their revenue source, some NbS projects, particularly those that are smaller in scale or have more nascent business models, may find it hard to generate cash flows that can compete with other sectors and asset classes. When compared to their investment needs (which may be high, especially for restoration and reforestation projects), this can result in low projected returns. Further, future cash flows from forestry or agricultural commodities may be subject to commodity risk, while cash flows for carbon and especially for less mature ecosystem services-based credits like biodiversity may be speculative if there is no offtaker in place before the project starts.

Risk-return profile

Another key barrier often cited by investors is the lack of transparent and available data and local understanding to accurately assess the risk-return profile of an investment in NbS, particularly in frontier and emerging markets. Many investors interested in deploying capital in NbS in these markets consider the sector too risky. This is due to political risk and often-weak policy and regulatory frameworks, unsecure land tenure, currency risks and reputational risks. Insufficient availability of large-scale NbS projects, lack of data to assess financial performance and environmental and social impact, high upfront costs, the need for long-term commitments from project developers and communities, potentially uncertain exit opportunities and difficulties monetizing other ecosystem services beyond carbon (like water, biodiversity, etc.) may heighten risk (real or perceived) in these markets.

Concerns of durability of ecosystem services over long timeframes, given potential disruptions from climate and other natural disasters, habitat or biodiversity loss, pests and disease and local management and monitoring capacity, may compound this further. Finally, frontier or more volatile markets may experience more significant challenges with regard to raising capital, project finance costs and a lack of liquid markets that can impede exit opportunities for NbS investments, given the lack of specialized investors, limited number of transactions taking place and pricing opacity.³⁷

Taken together and when measured against potential commercial terms and returns for many NbS investments as described in this and other sections, these risks can erode confidence in the risk-return profile of NbS investments, leaving many projects unfinanced because they do not meet hurdle rates or contain too much real or perceived risk.

Scarce catalytic capital

Public finance alone will be insufficient to address the financing gap for NbS. While private investment in nature has grown more rapidly than public investments in recent years, driven significantly by the growth of the carbon market in particular, it will be necessary to rapidly scale mobilization of private sector capital if we are to realize the full potential of NbS to address systemic challenges related to climate, nature and equity. Catalytic capital is a lever in helping private investors to overcome barriers and deploy greater capital by covering high-upfront costs, building an investment pipeline, de-risking investments and crowding in additional sources of capital. However, existing sources of catalytic capital from governments and development agencies, multilateral development banks (MDBs), development finance institutions (DFIs) and philanthropy may be too scarce at the moment to meet the full latent demand from private investors and project developers. Some catalytic capital providers may also require lengthy and bureaucratic administrative processes, requirements and guardrails that can deter some private investors.



Standards, methodologies, data and metrics

Standardized investment structures

NbS still represent a new asset class that lacks the standardized deal structures and contract templates that other well-established asset classes (such as infrastructure and energy) already have. However, it is rarely possible to extrapolate the financial instruments and business models used in these other asset classes for use in NbS investments, as they do not target the specific needs (longer terms, grace periods, etc.) of most NbS projects on the ground. NbS often require more novel deal structures – given the fragmented opportunities, smaller ticket sizes and partnerships required with project developers, communities, local governments, etc., which can increase transaction costs. In some cases, they may also benefit from risk-sharing mechanisms and patient capital. The lack of standardized deal structures and agreements may be particularly prominent in more nascent nature markets (biodiversity credits, for example) or in frontier or emerging market economies where even more conventional NbS sectors (such as sustainable forestry or agriculture) may lack the requisite market infrastructure and track record.

Complex natural capital valuation methods

While the last decade has seen a significant increase in the development of valuation methods to assess the direct and indirect impacts and dependencies of corporate operations and nature-related investments, such as the *Natural Capital Protocol*, these standardized methodologies have yet to achieve scale in an easy and cost-effective manner. The use of these types of methodologies is critical to helping investors and businesses better understand the economic value of the ecosystem services that nature produces and the risks and investment opportunities that the relationships between their business and nature generate. However, raising awareness of the importance of applying these methodologies, improving the methods available, collecting accurate and robust data, ensuring data comparability across ecosystems given their enormous heterogeneity and publicly disclosing this data still represent challenges to scale natural capital assessments. While some pioneering businesses have already undertaken natural capital assessments across their supply chains, mainstreaming the use of such methodologies across corporate supply chains and asset owner and manager investments in NbS will require much more work.

Benchmarks on returns and impacts

One critical barrier to scaling investments in NbS continues to be the lack of benchmarks on the returns and impacts such solutions can generate. Unfortunately, NbS investors rarely disclose the terms of their transactions, even when public investors are the only parties involved, limiting the amount of data available to offer comparisons when assessing the financial return of new potential deals. Since the market is still quite nascent and opaque and most of the transactions are bilateral and private in nature, there is still a lack of transparent and public data on the returns generated by NbS investments. While private investors and businesses may be more reluctant to publicly disclose data from their transactions, the lack of benchmarks also stems from public investors like MDBs and DFIs, which rarely make returns and other financial data from their investments publicly available. This challenge seriously limits the ability of any investors – and specifically institutional investors – to engage in the NbS sector.

This barrier also applies to the impact generated by NbS projects. NbS generate multiple social and environmental outcomes that may be more difficult to quantify than financial outcomes, such as biodiversity, benefits to local communities, watershed health, pollination, etc. However, for at least some of these outcomes, the number of tools to measure and quantify impacts – driven in particular by technological solutions – are increasing and becoming more robust. For carbon projects, while additionality remains a concern for baselining and accounting, remote sensing-based tools and dynamic baselining approaches can help improve climate impact transparency. And while there still is no market consensus on units for biodiversity, tools to assess it based on environmental DNA, bioacoustics, camera traps and remote sensing are emerging. Still, new tools may face numerous challenges in reaching scale and achieving cost-effective implementation. And for traditional, local or analogue knowledge and measurement tools, it can be difficult to ensure capacity and feasibility to monitor, collect and report data frequently. Overall, measuring environmental and social outcomes with confidence is more complex than financial outcomes, which can make it difficult for investors and businesses to understand and report their impact, though technology-based and other tools are continuing to mature.

Enabling environment

It's important to acknowledge the critical role that an enabling policy environment plays in facilitating investment. Policy frameworks that better incentivize the incorporation of nature and climate considerations and their value in economic decisions can be transformational in helping to unlock greater NbS investments and mainstream these solutions as an asset class at scale. This will require policies, regulations and standards that address market failures and negative externalities in the real economy (such as agriculture, forestry, energy and mining) and provide the incentives for businesses to protect, restore and sustainably manage natural capital. National Biodiversity Strategies and Action Plans are an example of national strategies that could encourage the private sector to finance NbS.

At the same time, it will be critical for investors to stay apprised of and plan for changes in policy, political and regulatory environments, such as the impact of new rulings from the Securities and Exchange Commission in the U.S. around environmental, social and governance (ESG) investing and disclosure requirements, or for carbon strategies, how national governments are treating new carbon trading mechanisms enabled by Article 6 of the Paris Agreement. This may present a challenge to investors, though, given that many public policy frameworks and environments germane to NbS investment strategies are continuing to evolve.

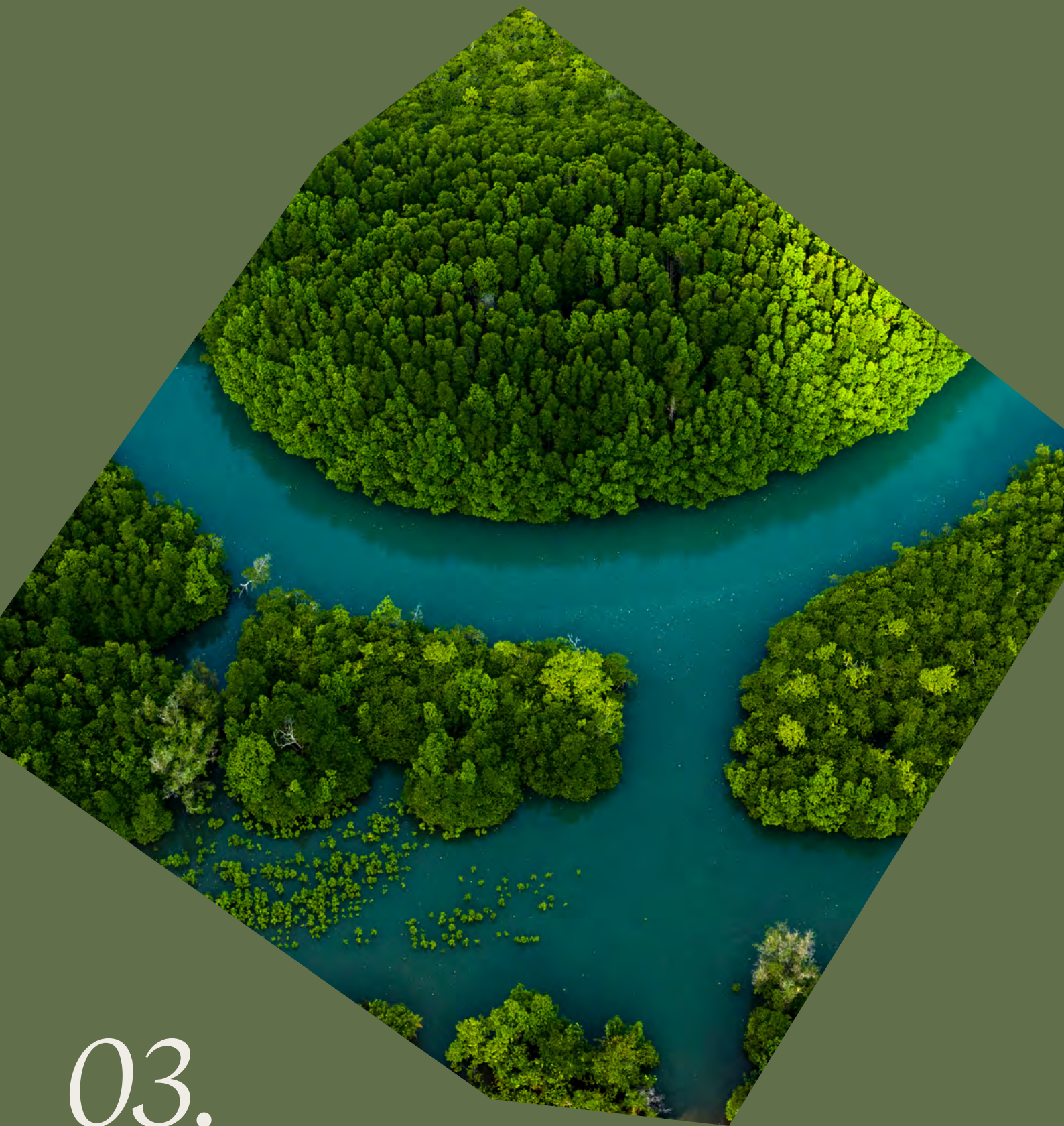
While FIC does not focus on policy, efforts like the [Forest & Climate Leaders' Partnership \(FCLP\)](#), which champions a country-driven approach, aim to scale up both new and existing NbS via collaboration between international governments, the private sector, civil society and community leaders. Launched by 27 countries and the European Union at the United Nations Climate Change Conference (COP27) in Sharm el-Sheikh, FCLP is developing country packages integrating technical, financial and diplomatic support to meet country-specific forest, climate and sustainable development goals. The country packages are based on country commitments, such as to a 1.5°C-aligned Nationally Determined Contribution, and other commitments to reduce illegal deforestation, reach landowners with incentives for forest conservation and direct all new agricultural production to previously cleared land. We are working closely with FCLP on opportunities to connect private capital with demand and activities within the country packages.

Reviewing this list of barriers, scaling investments in NbS can seem daunting. But stakeholders have already made significant progress. This report showcases examples of how investors and businesses are already investing in natural capital across asset classes, project types, sectors and geographies. The case studies demonstrate that – at least for barriers like commercial terms, risks and the lack of a track record for NbS investments (especially in emerging and frontier markets) – key innovations in partnerships, catalytic capital, combined investment strategies and ensuring impact can provide solutions.

We have used this analysis on current barriers to define a strategy and Theory of Change to help scale these and other solutions and identify where FIC can best add value, and which barriers it can address to catalyze greater investment in NbS.



The Forest *Investor Club*



03.

03. The Forest Investor Club

We aim to accelerate the pace of investment in forests and nature through four primary objectives:

1. **Expand the scale and geographic scope of investments in NbS;**
2. **Establish a track record of investments in NbS and sustainable land use in emerging and frontier markets to send a strong signal to other investors (such as institutional investors and asset managers);**
3. **Improve the capacity of our members and other investors to source, screen and invest in forest-related and sustainable land-use projects;**
4. **Ensure our members and other organizations include FIC-generated knowledge in their capital allocation processes.**

Our membership consists of 16 founding Members – including businesses, asset managers, banks, development finance institutions (DFIs), government agencies and NGOs – and two Network Partners (see Figure 2). Member organizations that join FIC have their own capital to deploy for NbS. Network Partners – for example, alliances/platforms, technical service providers, project developers, NGOs, research institutions and international organizations – provide technical advice on NbS investment, access to potential pipeline of investment opportunities and alignment with complementary efforts to scale investments.

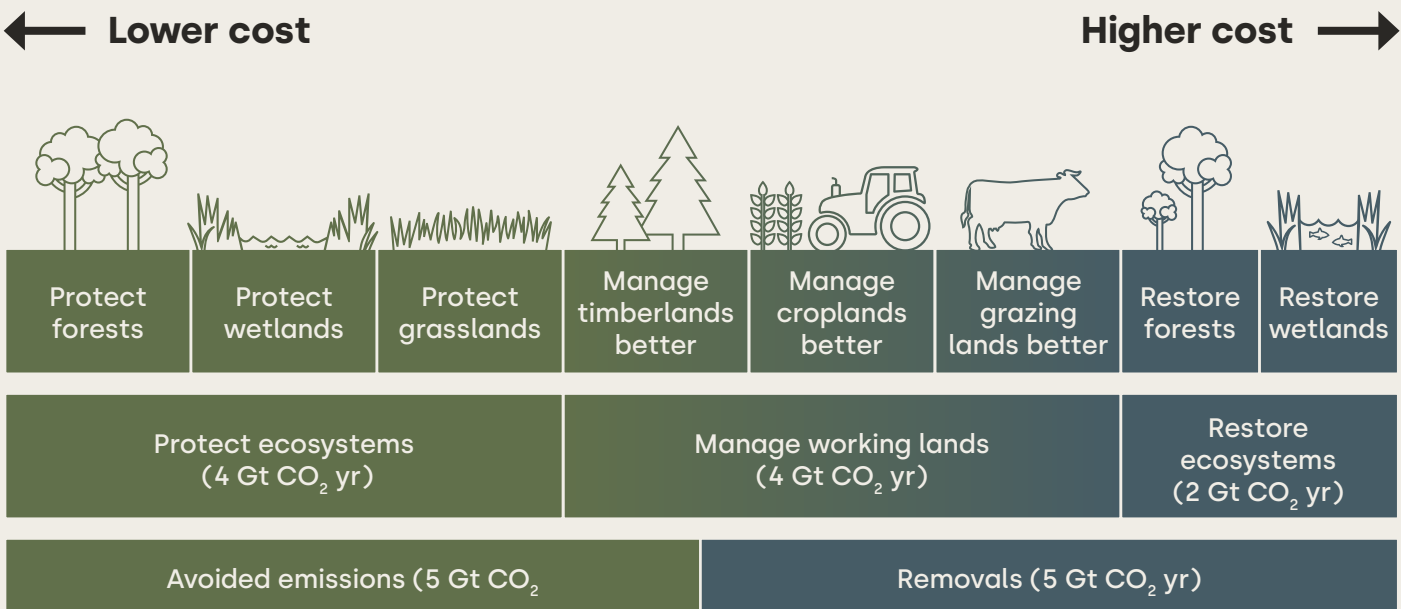
Figure 2: Forest Investor Club membership

Members	Businesses	Apple
	Asset managers	BTG Pactual Timberland Investment Group (TIG) Lombard Odier Investment Managers (LOIM) Pollination Manulife Investment Management Mirova New Forests SAIL Ventures
	Banks	Deutsche Bank Goldman Sachs
	DFIs and government agencies	U.S. Agency for International Development (USAID) Finnfund U.S. International Development Finance Corporation (DFC) Norfund
	Non-profits	Conservation International The Nature Conservancy
Network Partners		Convergence Natural Capital Investment Alliance

Our geographic scope extends to nearly 50 countries across Latin America and the Caribbean, sub-Saharan Africa and Asia and the Pacific. These countries were identified as important targets for investment in NbS, given the significance and potential vulnerability of their natural ecosystems and their ability to mitigate the effects of climate change and biodiversity loss. These countries also represent emerging and frontier markets, many of which have low levels of investment in NbS. The scope of investments FIC focuses on can be across the spectrum of protection, restoration and sustainable management of a range of ecosystems and working lands, from forests, wetlands and grasslands to sustainable approaches to managing timberlands, croplands and grazing



Figure 3: Range of nature-based solutions and their emissions reduction potential



Source: Chart adapted from Respira International with data from Girardin et al., 2021³⁸

We achieve our objectives through four action areas

(see Figure 4):

- 1 Partnerships:** Facilitating high-quality connections among FIC Members and with other partners, such as connecting catalytic capital/blended finance providers and private investors, and connecting businesses, financial institutions and private investors with project developers.
- 2 Pipeline and matchmaking:** Originating and conducting light screening of a pipeline of new potential investments, with a specific focus on natural ecosystems and intact lands (forests, grasslands, wetlands), native cover and degraded lands (forests, wetlands) and working lands (timberlands, croplands, grazing lands) and connecting the potential pipeline to public and private investors.
- 3 Knowledge sharing and solutions:** Pre-competitive knowledge sharing among members on topics such as investment principles, best project archetypes (such as on green infrastructure, sustainable agriculture, forest conservation and restoration), appropriate investment vehicles and their scalability, high-integrity nature markets (for instance, intrinsic, credit and derivative) and partnerships.
- 4 Showcasing and amplification:** Publicly sharing and recognizing innovative partnerships and investments of FIC Members to demonstrate a growing track record of investments mobilized for forests and nature.

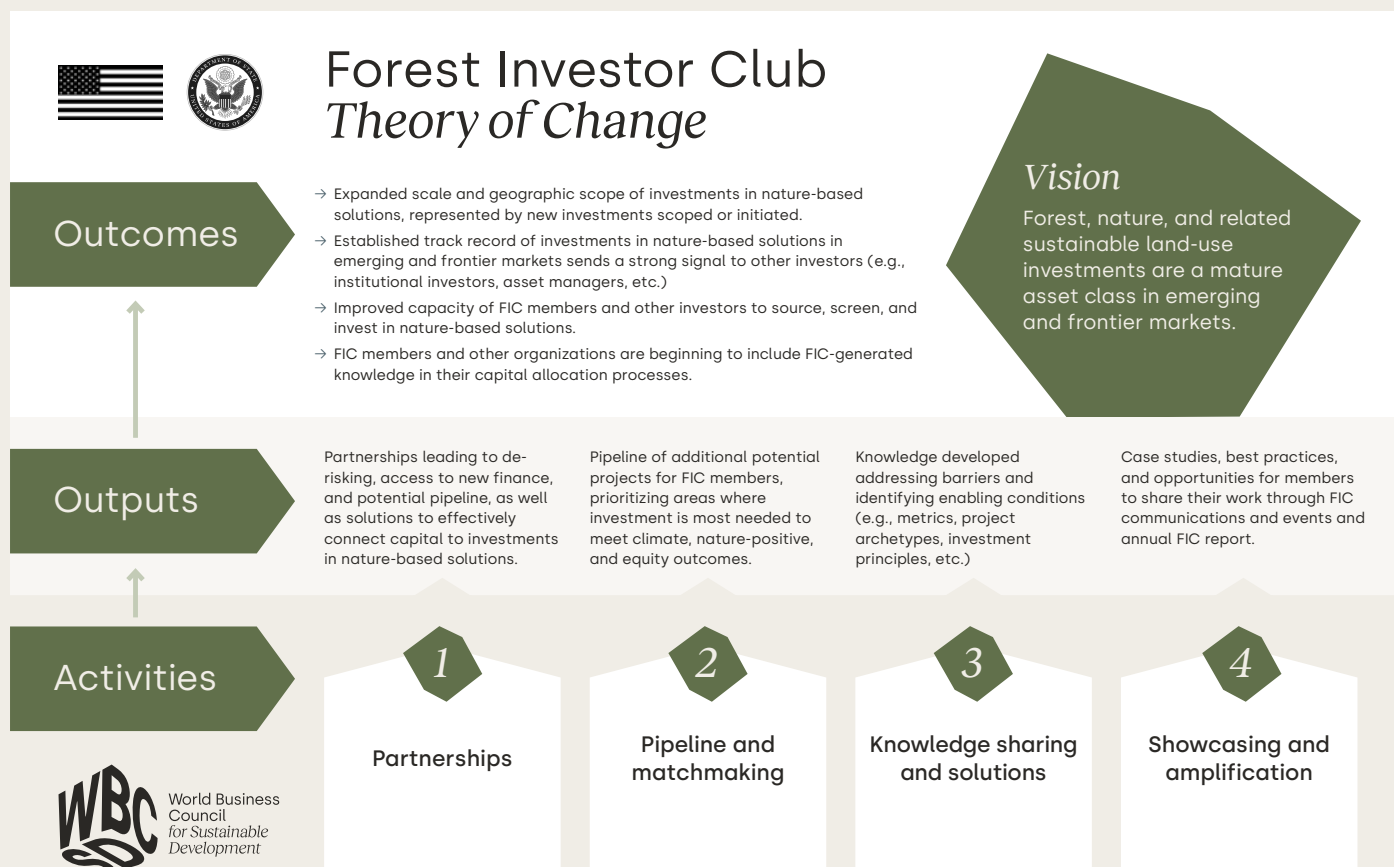
Members can actively engage in several areas across our activities, such as:

- Exploring potential collaboration with new and existing partners that can accelerate the deployment of capital, including catalytic capital, in forests and nature;
- Exploring investment opportunities and initiating investments where feasible and attractive;
- Providing input and feedback and serving as pilot users of tools and guidance developed by FIC working groups;
- Contributing to knowledge sharing and communications, such as case studies and panels.

While our members are already deploying significant capital to forests and other NbS projects, barriers remain to scaling greater investment, especially into emerging and frontier markets. By sharing best practices and lessons learned, facilitating partnerships across different types of capital providers and identifying potential opportunities in collaboration with originators and other platform partners, we can contribute to de-risking and unlocking greater investment into these markets.

In the next section, we explore insights from a landscape assessment of organizations and initiatives working to move the needle on addressing these barriers and increasing investment in NbS. We also identify differentiators and complementarities with the FIC.

Figure 4: Forest Investor Club Theory of Change



Landscape assessment of initiatives addressing investment in nature-based solutions



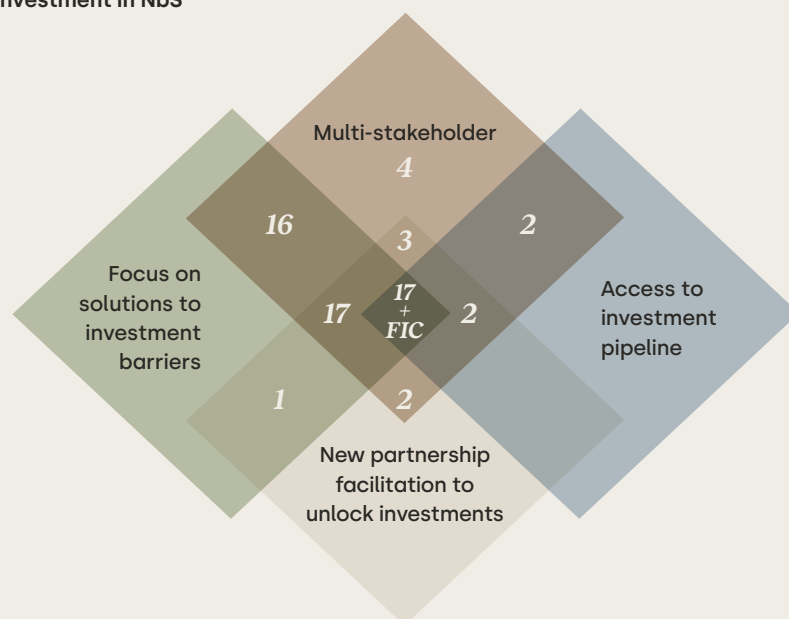
04.

04. Landscape assessment of initiatives addressing investment in nature-based solutions

Going as far back as the last decade – but at a faster pace in recent years – a growing number of multi-stakeholder initiatives have emerged to address the barriers described in [Section 2](#) and increase the scale of investment in the protection, restoration and sustainable management of forests and other NbS. While there may be some overlap and shared characteristics across different initiatives – including structures, membership, mandates and objectives – there is also diversity in their focus, strategies, resources, networks and theories of change.

We conducted a landscape assessment of 64 initiatives focused on or supporting investment in NbS based on four key characteristics – a focus on solutions to investment barriers, facilitating new partnerships, the development of a pipeline of investment opportunities and being multi-stakeholder in nature. Of the initiatives identified, 17 share all these characteristics.

Figure 5: Landscape assessment of 64 initiatives focusing on or supporting investment in NbS



The following are some examples of multi-stakeholder organizations and initiatives among the 17 identified in the research with a focus on solutions to investment barriers, facilitating new partnerships and the development of an investment pipeline.

- **Convergence** is a global network of public, private and philanthropic investors and sponsors of transactions and funds that generates blended finance data, intelligence and deal flow to increase private sector investment in developing countries.
- The **Lowering Emissions by Accelerating Forest finance (LEAF) Coalition** is a public-private partnership that aims to halt deforestation by financing large-scale tropical forest protection.
- **NatureFinance** places nature-positive and equitable outcomes at the heart of global finance, from sovereign debt markets to early-stage investor ecosystems, risk-related metrics, food system transition and anti-money laundering.
- **Partnerships for Forests** supports the development of partnerships between private sector companies, public sector actors and people that catalyze investment in forests and sustainable land use.
- The **ClimateShot Investor Coalition (CLIC)** is an action-oriented and member-driven coalition of leaders in the impact investment community that aims to collectively scale up and accelerate finance for agriculture and food systems globally, with the ultimate goal of shifting them to a low-carbon and climate-resilient pathway by 2030.
- The **Global Innovation Lab for Climate Finance** is an investor-led, public-private initiative that accelerates innovative, well-designed, early-stage climate finance solutions and instruments.
- The **Amazon Investor Coalition** is a global learning and collaboration platform that unites philanthropies, private investors and corporate buyers with governments, non-profits and allies to increase forest-friendly economic development and the rule of law across the Amazon region.
- **Innovative Finance for the Amazon, Cerrado and Chaco (IFACC)** is an initiative of the United Nations Environment Programme, the Nature Conservancy and the Tropical Forest Alliance serving banks, companies and investors seeking to expand innovative finance for deforestation-/conversion-free beef and soy in these regions.
- **Capital for Climate** is a climate solution investment accelerator that facilitates strategy formulation, asset allocation and opportunity sourcing across science-based decarbonization pathways. It works with investment communities to provide market intelligence, overcome investment barriers, find deal partners and help shape markets.
- **Coalition for Private Investment in Conservation (CPIC)** is a global multi-stakeholder initiative focused on enabling conditions that support a material increase in private, return-seeking investment in conservation. CPIC aims to facilitate the scaling of conservation investments by creating models for the successful delivery of investable priority conservation projects, connect a pipeline of providers with deal structuring support and convene conservation project delivery parties with investors to execute investable deals.
- **Giving to Amplify Earth Action (GAEA)** is a global initiative to fund and grow new and existing public, private and philanthropic partnerships (PPPPs) to help unlock the USD \$3 trillion in financing needed each year to reach net-zero emissions, reverse nature loss and restore biodiversity by 2050.

Our assessment found that while the NbS finance landscape is rich with multi-stakeholder initiatives, there are also niches that need filling. As Figure 5 makes clear, the overall focus of organizations across the assessment skews toward addressing solutions to investment barriers and less so on developing partnerships and access to an investment pipeline. The landscape is also ripe with opportunities for collaboration. Partnerships across initiatives to leverage complementary strengths, resources and networks can improve access to investment opportunities, catalytic capital, co-investment and technical expertise, tools and data resources to help address investment barriers.

The research identified a wide variety of actions different organizations are taking to address common NbS investment barriers – from creating enabling conditions and piloting tools to developing projects and new investment models. A deeper assessment of the 17 initiatives sharing all four characteristics presents further insights:

- While all 17 multi-stakeholder initiatives focus on strategic partnership facilitation, addressing barriers to investment and access to pipelines of investments, they each emphasize these to varying degrees, while FIC places a strong emphasis on all three.
- There is also a range of sector focus among the initiatives – some focus on a narrow subset of NbS sectors (such as food systems), while others focus on climate finance solutions broadly (both nature- and non-nature based). FIC focuses on the full range of NbS, including forests (see Figure 3).
- While there is a variety of sector focus, in terms of emerging and frontier markets there tends to be certain countries with higher levels of interest and activity from investors (e.g., Brazil, Indonesia). FIC focuses on both countries where there is already existing interest and activity and other emerging and frontier markets where there has historically been less NbS investment.
- A focus on understanding opportunities from NbS beyond just agriculture and forestry commodities or carbon alone would be helpful for investors. FIC focuses on the holistic value of NbS and all potential revenue generation opportunities, including commodities and carbon as well as emerging nature market opportunities, for example through biodiversity credits.

- Through our research, we found that there is real need to bring together a range of public and private investors with opportunities for partnerships with catalytic capital providers. FIC is composed of both public and private sector NbS investors and is prioritizing matchmaking across sectors to sources of catalytic capital.

FIC is able to add value within the landscape given its unique combination of strategic emphasis, partnership composition and approach, and geographic and sectoral focus. At the same time, we recognize the importance of collaboration and coordination with other initiatives on knowledge- and resource-sharing and where there are complementary efforts that can better advance collective goals.

Specifically, the assessment informed our priority to strengthen partnerships with initiatives and organizations that:

- **Can provide access to catalytic capital;**
- **Have a strong focus on sharing investment knowledge and expertise;**
- **Can provide access to aggregated and/or large-scale projects;**
- **Also benefit from U.S. Department of State sponsorship and management, with a focus on forest or NbS investment;**
- **Represent networks of businesses that can potentially provide investable opportunities through their supply chains.**

The landscape assessment and analysis of current investment barriers has helped us set our Theory of Change and strategy to focus on activities that fill gaps in the sector and maximize the potential impact of FIC, while being clear about what we can and cannot do.

Accomplishments: *Building a foundation for partnership and investment*



05.

05. Accomplishments:

Building a foundation for partnership and investment

FIC was conceived as an initiative that can be greater than the sum of its parts. Since its launch, FIC Members and the Secretariat have worked to define the impact that we want to have, how we add value and to get structures in place to support our work. Through consultation with each FIC Member, the U.S. Department of State, and external experts and stakeholders, we adopted a strategy and action program in 2023 to realize the outcomes and ultimate vision for impact that members want to see (see Figure 4: Forest Investor Club Theory of Change). At the same time, our members have already undertaken a number of activities since late 2022 and continue to deploy new and innovative investments in forests and nature.

Partnerships

We aim to cultivate partnerships between members and other organizations that can help de-risk investment strategies and provide access to new capital, partners and investment opportunities to scale up and more effectively connect capital to investments in forests and nature.

- Members convene regularly, both virtually and in person, for pre-competitive discussion on addressing barriers and other topics to scale investments in forests and nature. These include a business, investor and NGO dialogue hosted by Lombard Odier and Partnership for Forests during New York Climate Week 2022 and two virtual Sustainable Forests Investment Consultations in late 2022 aimed at answering the question: How can we enable public and private sector financial institutions to play a more effective role in incentivizing and financing re- and afforestation?
- We held consultations with WBCSD sector alliances, including [Banking for Impact on Climate in Agriculture](#), the [Forest Solutions Group](#), and the [Natural Climate Solutions Alliance](#), to better understand the alignment of our strategy with these sector-focused efforts.
- To inform our strategy, ensure that we deliver value and identify key partnerships, the Secretariat completed a comprehensive landscape assessment of forests and nature-related investment initiatives globally in early 2023 (see [Section 4](#)).
- The Secretariat and members adopted Principles for investing in Nature-based Solutions and membership requirements to guide the strategic partnerships formed by FIC (see [Appendix H. Forest Investor Club Investment Principles](#)).

Pipeline and matchmaking

Fundamental to our work is the identification of a pipeline of potential projects seeking capital and the prioritization of areas where investment is needed most to meet climate, nature-positive and equity outcomes.

- We are formalizing a process for the pre-identification of potential pipeline opportunities for members based on an understanding of the types of investment each member is seeking.
- At the same time, a number of discussions are underway with organizations that have access to potential projects seeking capital that align with us, such as from FIC Members and Network Partners, WBCSD member company supply chain projects, private sector project developers, NGOs and pipeline platforms.
- As one example, we have initiated an [assessment of the potential case for investment to scale up the Farmer First Clusters](#) – an initiative to provide solutions to address soy-driven deforestation and conversion in four key Cerrado landscapes in Brazil.
- As part of the International Working Group for the [Forest and Climate Leaders' Partnership \(FCLP\)](#), we are coordinating with the FCLP secretariat on opportunities to connect our members with the country-driven investment packages under development.

Knowledge sharing and solutions

We seek to provide a space for pre-competitive knowledge sharing among members to address barriers and identify enabling conditions, like investment principles, project archetypes, scalability of investment vehicles, high-integrity markets and partnerships.

- Members identified key themes for working groups, including nature markets, approaches to de-risking investments and combined natural capital and food and fiber investment strategies.
- The Nature Markets working group launched in Q2 2023 and is developing a guide for investors to better understand high-integrity nature markets, focusing on carbon but also including more nascent markets such as for biodiversity.

Showcasing and amplification

We also serve as a platform to elevate awareness of investing in forests and nature and demonstrate a growing track record and opportunity in these markets.

- We led a session on Nature Finance for Corporate Leaders during New York Climate Week 2022, with more than 40 corporate president, SVP, VP and CSO participants. A WBCSD Council Meeting session on Nature Financing in November 2022, with more than 110 participants – including 10 CEOs of global companies – also highlighted our work.
- We published an initial set of case studies and lessons learned in mid-2023 in partnership with the Good Food Finance Network showcasing how partnerships can help deploy private capital in sustainable land use and featuring the connection between investments in forests and food systems. The appendices in this report include five additional case studies on FIC Members across a variety of investment strategies and risk profiles.
- We hosted a breakout session at the GreenFin conference in June 2023 on Accelerating Forest and Nature Investment: The Forest Investor Club, featuring members Manulife, Timberland Investment Group and the U.S. International Development Finance Corporation.
- We are hosting a session during NY Climate Week 2023, through the Nature Positive Hub, featuring member case studies and the findings of this report.
- Beginning with this report, we will publish an annual report providing updates on our progress, raising further awareness and building the capacity of investors to source, screen and invest in forests and nature.



Summary of *Forest Investor Club case studies, themes and key findings*



06.

06. Summary of Forest Investor Club case studies, themes and key findings

FIC Members are already developing and executing innovative investment strategies to drive capital into high-impact forestry and other NbS projects. In June 2023, we worked in partnership with the Good Food Finance Network (GFFN) to release a set of five case studies, including two featuring FIC Members (New Forests and SAIL Ventures), to showcase these efforts while also synthesizing some of the key themes and best practices, in particular regarding investment partnerships.³⁹

As part of this Annual Report, we are building on this body of work with the release of five additional case studies on NbS investment strategies developed, executed and managed by members that achieve both sustainable and attractive financial returns while advancing nature-positive outcomes. The following presents a summary of all FIC Member case studies, including the two released earlier this year. The case studies themselves are available in [Appendices A-G](#) and on our [website](#).

Apple (Restore Fund)

Apple launched the Restore Fund with Goldman Sachs and Conservation International in 2021 to restore degraded areas and invest in sustainable working forests, generating attractive returns while removing carbon. In 2023, Apple expanded the Restore Fund in partnership with Climate Asset Management, creating a new combined strategy focused on nature-forward agriculture and the restoration of critical ecosystems.

BTG Pactual Timberland Investment Group (Latin America Reforestation Strategy)

One of the largest and oldest timber investment management organizations (TIMOs) in the world, Timberland Investment Group (TIG) launched an impact-oriented reforestation investment strategy in Latin America in 2021 that aims to acquire and restore 300,000 hectares of degraded land, half of which it will reforest with native species and set aside for conservation.

Conservation International Ventures

An impact-first investment program managed by the globally recognized non-profit Conservation International (CI), CI Ventures combines 36 years of climate and conservation science to design, showcase and mainstream mechanisms to address the investment gap in biodiversity and climate concerns, while acting as a catalytic force to bring further funding to the space.

Lombard Odier Investment Managers (New Food Systems strategy)

Lombard Odier Investment Managers (LOIM), the asset management arm of the Swiss banking group Lombard Odier, recently partnered with systems change firm Systemiq to build holistiQ Investment Partners (holistiQ),* a sustainable investment platform within LOIM that aims to deploy capital for a net-zero and nature positive economy. The New Food Systems strategy, launched by LOIM in July 2022 and now part of the holistiQ platform, seeks to invest in public equities that develop and mobilize new forms of healthy and sustainable protein, new agricultural practices and new delivery models as part of its objective to invest in a food system that can meet the nutritional needs of a growing population within the constraints of planetary boundaries.

Mirova (Land Degradation Neutrality Fund)

Long a leader in sustainable finance, Mirova serves as the independent investment manager for the Land Degradation Neutrality Fund (LDN Fund). The Mirova LDN Fund, initiated by and co-promoted with the UN Convention to Combat Desertification (UNCCD), focuses on advancing Sustainable Development Goal (SDG) 15.3 – ending desertification and restoring degraded land to achieve land degradation-neutrality by 2030 – through long-term debt and equity financing for projects and companies in the agroforestry, forestry and regenerative agriculture sectors, as well as other land-based activities.

New Forests (African Forestry Impact Platform) – originally released in June 2023

New Forests, a global investment manager of nature-based real assets and natural capital strategies, has partnered with DFIs to launch the African Forestry Impact Platform (AFIP), which invests in sustainable forestry operating companies and related assets in sub-Saharan Africa. Its aim is to deliver commercial returns alongside conservation and sustainable development outcomes at scale.

SAIL Ventures (&Green Fund) – originally released in June 2023

SAIL Ventures, a global alternative asset manager, serves as a specialist investment advisor to the &Green Fund, which finances the decoupling of major commodity supply chains from deforestation in a way that is commercially viable and replicable.

* holistiQ Investment Partners ("holistiQ") is a LOIM platform powered by a partnership with Systemiq and was announced on 6 June 2023. holistiQ is a trading name of LOIM and is not a legal partnership or other separate legal entity.

While each of these case studies, developed through desktop research and stakeholder interviews, is unique, with its own investment strategy, geographic and sectoral focus and investment partnership approach, they have revealed some common themes, novel approaches, lessons learned and best practices, as presented below. Together, these insights can help inform how these and other investment strategies in NbS can scale in size, pace and global reach.

Innovative partnerships

Innovative partnerships can play a critical role in mobilizing greater investment in global efforts to enhance natural capital. By leveraging complementary resources and expertise across sectors and disciplines, novel partnerships can help ensure the effective and efficient use of capital to drive meaningful impact toward financial, environmental and social goals. Partnerships are essential to mobilizing and deploying capital effectively and to sharing lessons learned and designing bespoke solutions that can provide a comparative advantage, increase competitiveness and ensure stakeholder satisfaction. Establishing strategic and long-lasting partnerships requires a significant amount of time and effort, especially with the limited number of organizations/agencies available to help arrange them. Owing to these factors, the case studies and consultations with our members emphasize how partnership building comes down to organizations having the necessary soft skills and time, the ability to identify the right individuals to work with, and the capacity to build personal rapport over, quite often, extended periods.

While many of the case studies presented feature partnerships between the private and public sectors (for example, Mirova's partnership with UNCCD, the European Investment Bank and national government agencies in the LDN Fund, and New Forests and SAIL Ventures partnerships with DFIs through the African Forestry Impact Platform and &Green Fund, respectively), there are impactful opportunities for increased collaboration and partnership across different types of actors, industries and disciplines within the private sector as well. The recent announcement in June 2023 of the *holistiQ* platform within LOIM built in partnership with Systemiq exemplifies the value in leveraging different sets of expertise and capabilities across different private sector actors, by bringing an integrated approach to translate science-based quantitative research on the transformation of key economic systems into investment strategies for clients. And Apple turned to the long-time investment management experience and resources of Goldman Sachs to manage the Restore Fund at its launch and then to Climate Asset Management – itself a joint venture between Pollination and HSBC Asset Management – to manage its second commitment.

Other types of partnerships and collaboration that can help the successful implementation of, and reduce barriers to, NbS investment strategies remain relatively underdeveloped – particularly those with local governments, project developers, small and medium-sized enterprises (SMEs), local NGOs, indigenous groups, farmer organizations and other partners on the ground. And for all types of partnerships, there is recognition of the need for appropriate venues, time and resources to facilitate, establish and maintain strategic and long-term partnerships. FIC can help play a catalytic role in this through our network and matchmaking efforts and by fostering new strategic partnerships that enhance our members' ability to scale their investment strategies.

Catalytic capital

One of the most powerful benefits new partnerships can bring to support NbS investment strategies is access to catalytic capital. As highlighted in [Section 2](#), many prospective nature-based investments, particularly in emerging and frontier markets, may face low or uncertain revenue potential, high risk, long lead times to generate positive cash flows and a lack of understanding of market dynamics and resources for on-the-ground development and implementation. Catalytic capital – whether through first-loss or concessionary capital, guarantees or other forms of credit enhancement or insurance, recoverable and non-recoverable grants, development or bridge financing, funding for technical assistance or other instruments – has the potential to reduce some of these barriers, improve the risk-return profile for NbS investments and crowd in more traditional private investors to bring them to scale.

This is exactly the approach embodied by CI Ventures through its venture philanthropy model, which has leveraged USD \$19 million in risk-tolerant capital to attract and mobilize an additional USD \$86 million in co-financing and follow-on investments. By proving the bankability and impact of its portfolio companies through these early investments, CI Ventures has been able to raise 7-10 times more capital as follow-on investments.

When New Forests looked to bring its 18-year forest asset management experience to sub-Saharan Africa through the African Forestry Impact Platform, it sought partnerships with DFIs to provide a cornerstone investment that would help realize opportunities to scale and transform the sustainable forestry sector there. With a risk-return profile and an established track record that is different from those in developed markets, the sustainable forestry sector in sub-Saharan Africa has difficulty attracting more traditional forms of private investment, particularly for more impact-oriented opportunities. The partnerships with DFIs (British International Investment, Norfund and Finnfund) have brought USD \$200 million in catalytic investment to the African Forestry

Impact Platform to help the sector develop and demonstrate investability. New Forests has kept the vehicle open-ended in anticipation of attracting additional long-term institutional capital to scale it by USD \$500 million in the next 2 to 3 years and with the aim to expand funding to landscape-scale and NbS investments.

Similarly, the &Green Fund advised by SAIL Ventures has already raised USD \$180 million in capital from a range of public, philanthropic and corporate sources, but it aims to reach USD \$1 billion in assets under management over the next 10 years. It intends to scale by strategically designing instruments that leverage its catalytic capital resources to de-risk and mobilize private capital from institutional investors that can support agri-commodity businesses in implementing more sustainable practices for land-use management and fostering sustainable and more inclusive supply chains.

One example of the way catalytic capital has already helped mobilize and attract private investment is the LDN Fund managed by Mirova. Since its final closing in March 2021, the fund has raised USD \$208 million from public partners (including the French Development Agency (AFD), the European Investment Bank, the UK Department for Environment, Food and Rural Affairs (DEFRA), Global Affairs Canada, and the Government of Luxembourg) and private partners (such as Allianz, BNP Paribas Cardif, Fondation and Natixis Assurances). By blending in catalytic, first-loss capital from public partners, the Mirova LDN Fund provides patient capital to the transformative projects it invests in while offering its private partners more reliable and attractive returns.

In addition, the Sustainable Trade Initiative (IDH) manages an associated LDN Technical Assistance (TA) Facility, funded by AFD and the Global Environment Facility (GEF), that operates as the grant-making arm of the LDN Fund. The LDN TA Facility leverages this catalytic donor funding to provide recoverable and non-recoverable grants to (potential) LDN investments that provide pre-investment project design support, post-investment implementation assistance, impact monitoring and learning- and knowledge sharing, helping to de-risk potential investments of the LDN Fund itself and set them up for success.

Combined investment strategies

While blending in catalytic capital offers one approach to address traditional barriers to investment, another approach is to combine different components within investment strategies themselves. High-impact projects in particular, like the restoration of critical native ecosystems, often have lower return potential and longer timeframes to generate positive cash flows. But by combining investments in these types of solutions with others that can generate greater and earlier cash flows, it can enable new access to financing for some of the highest conservation value investments, while achieving an attractive blended return overall.

Apple employs a unique blended strategy for its second Restore Fund commitment, which combines investments in nature-forward agricultural projects that generate income from sustainably managed farming practices with those in projects that conserve and restore critical ecosystems that remove and store carbon from the atmosphere. The income from the agricultural investments, when combined with the independently verified and certified carbon removal credits, will help the blended fund structure achieve financial and climate benefits for investors.

Timberland Investment Group has also pursued an innovative combined approach for its Latin American Reforestation Strategy. Of the 300,000 total hectares of degraded land it seeks to acquire and reforest, it intends to plant half as Forest Stewardship Council (FSC)-certified commercial plantations with long rotation cycles, while restoring and conserving native forest on the remaining half and setting it aside into long-term conservation. The commercial revenues from the plantations on previously degraded land serve as a catalyst to pay for additional restoration and conservation of native ecosystems at scale. In the Brazilian Cerrado, for example, local laws require landowners to allocate 20% of their area for conservation. But by blending in returns from harvesting, it enables TIG to scale its conservation ambitions by 2.5x (to 50% of the area) and focus on the ecosystem quality and native composition of the rest of its portfolio.

Recognizing that achieving land degradation neutrality globally will require a holistic effort, the Mirova LDN Fund also employs a mixed approach to meet different needs, opportunities, geographies and sectors. It combines debt and equity offerings for a range of projects and programs globally, representing various sectors and project types all working toward the goal of mitigating land degradation, while benefitting local communities and generating other environmental benefits.

Focus on quality of outcomes

To realize the full potential of NbS to address global environmental challenges and economic opportunities and ensure that the impacts they have are meaningful and of high value, it is critical to build in mechanisms to validate their outcomes and efficiently guide investments into high-quality opportunities. New approaches, tools and guidance continue to emerge and mature in the nature-based carbon market, for example, to identify high-quality projects and ensure carbon impacts are real and additional. New methodologies and technologies to assess the impact of investments in the nascent biodiversity and other nature markets are also proliferating. At the same time, it is imperative to have social and environmental safeguards in place to protect and support local and Indigenous communities.

All of the examples featured here recognize the importance of enabling meaningful outcomes from their investments and using a range of tools, resources, guidelines and new partnerships to assure and monitor positive and high-quality impacts.

- **Apple** has rigorous social and environmental standards in place for the Restore Fund and has partnered with Conservation International to identify and guarantee the high-conservation value of its investments. Further, it is deploying innovative remote sensing technologies to map, quantify and verify the carbon impact of the projects it invests in and is exploring applications of the LiDAR Scanner on iPhone to enhance monitoring capabilities on the ground.
- **Timberland Investment Group** is also partnering with Conservation International, which serves as an impact advisor on its Latin American Reforestation Strategy, to maximize environmental benefits and support landscape-level restoration and conservation. In this role, Conservation International appoints two of the three members of the strategy's Impact Advisory Board, which is responsible for developing impact criteria and monitoring implementation. For each potential acquisition, TIG also applies ten Responsible Investment Principles to each potential acquisition, ensuring confidence in the strategy's ability to uphold TIG's broader environmental, social and governance (ESG) objectives and framework.
- **CI Ventures** is in a unique position to prioritize impact by drawing on its institutional expertise and resources in conservation science and climate change, while prioritizing local livelihoods and human well-being. The program implements a rigorous approach to impact investing, doing what other lenders and traditional investors cannot: prioritizing impact, investing at the most catalytic moment, leading with science and amplifying the impact of every dollar invested.
- The **LOIM** New Food Systems strategy applies a "research-driven" approach, with an aim to invest in the transformation of the sustainable food value chain. As one of five sustainability-driven strategies that are part of the *holistiQ* platform at LOIM*, it applies an integrated approach, combining analysis across commercial, environmental, and societal factors, with an aim to accelerate the emergence of sustainable, regenerative, nature-positive economic systems.

- **Mirova** and IDH have also partnered with Conservation International on the LDN Fund, creating a measuring toolkit to monitor the social and environmental impact of each investment that specifically focuses on indicators for land productivity, land cover and soil organic carbon.
- **New Forests** applies its responsible investment policy and a rigorous and innovative approach to sustainability across its investments and uses consistent and comprehensive ESG frameworks and processes at every step of investment management. Its African Forestry Impact Platform also draws on technical assistance from Partnerships for Forests, a UK Foreign, Commonwealth & Development Office-funded program that works closely with the platform to identify and develop new business models that deliver social and environmental value to smallholders and other landscape stakeholders while generating tangible investor returns.
- The &Green Fund advised by **SAIL Ventures** requires three commitments from prospective clients – a No Deforestation, No Peat and No Exploitation (NDPE) Policy, an Environmental and Social Action Plan (ESAP) and a Landscape Protection Plan. Social inclusivity is core to &Green Fund's Theory of Change and it uses a robust key performance indicator (KPI) framework and environmental and social management system (ESMS) to assess the degree to which investments are transformational and to monitor the impacts they deliver.

In addition to guidelines, policies, tools and partnerships to ensure impact from the investment strategies described here, new and emerging design features of these strategies themselves may also help incentivize environmental and social impact performance. For example, impact-linked compensation structures represent a growing effort to tie returns to fund managers from carried interest to the achievement of key environmental, social or other impact goals.⁴⁰ New Forests links its carried interest at year 10 in the African Forestry Investment Platform to achieving goals for the platform's impact on biodiversity, carbon, gender and improved and alternative livelihoods. Mirova also uses an impact-linked carried interest structure for the Mirova Environment Acceleration Capital fund.⁴¹

* The New Food Systems strategy was launched by LOIM in July 2022 and is now part of the *holistiQ* platform.

Conclusion



07.

07. Conclusion

Natural capital underpins the health of communities, businesses and economies all over the world. Nature-based solutions have the potential to enhance natural capital to mitigate global systemic challenges related to climate, biodiversity loss, land degradation and social equity. Despite the immense benefits NbS provide, they have been historically undervalued. While in more recent years investments in NbS have grown, financing gaps remain. To realize the full potential of nature to limit climate change to below 1.5°C warming, halt biodiversity loss and achieve land degradation neutrality on critical timeframes, a total of USD \$11 trillion in cumulative financing will need to be deployed into NbS by 2050. This will require a doubling of current investment levels by 2025 and tripling them by 2030.⁴²

A number of barriers stand in the way of catalyzing these investments at scale. These include the need for greater capacity development to source, design, evaluate and conduct due diligence on investable opportunities, the need to ensure NbS commercial terms and risk-return profiles can compete with more traditional investments, as well as the particular challenges and risks in emerging and frontier markets that have not yet benefitted from significant NbS investments or the market development to better enable it.

The U.S. Department of State formed the Forest Investor Club as a network of leading public and private financial institutions, companies and other investors committed to protecting, restoring and sustainably managing forests and nature. Our goal is to help address some of the most significant of these barriers to investment in NbS. By creating a venue for the pre-competitive sharing of knowledge among members and through the facilitation of strategic partnerships and the identification of potential investable opportunities, we aim to reduce traditional barriers to and scale NbS investment, especially in emerging and frontier markets. By recognizing and sharing examples of innovative partnerships and investments – such as those exemplified in the case studies presented here – we aim to demonstrate the growing track record and key innovations of investments mobilized for forests and nature and connect to complementary efforts and new potential members and partners (see [Appendix I](#) for more information about joining FIC).

Since WBCSD became the FIC Secretariat, we have formalized our strategy, Theory of Change, investment principles, governance, and new membership process. We have also progressed on key objectives centered on partnership cultivation, pipeline identification and matchmaking, knowledge sharing and solution development, and showcasing and amplification. In the coming months, FIC will prioritize ramping up its efforts to identify new partnership and investment opportunities for its members, establishing metrics to assess its impact, continue the work of the Nature Markets working group, and launch two other working groups planned around catalytic capital and food and fiber-based investment strategies.

We recognize that FIC is not alone in its efforts, and an “all hands” approach will be necessary to meet ambitious goals to scale NbS investments to address global challenges. We look forward to exploring collaboration with other organizations, platforms and initiatives to achieve our collective goals.

We thank the U.S. Department of State for supporting this effort and FIC Members and Network Partners for their ongoing participation and contribution.



Appendix A. Case Study:

Apple Restore Fund

Removing carbon from the atmosphere – a solution that is both scalable and financially attractive to businesses.

Location

Global

Background

Climate change poses one of the most significant global threats the world has ever faced. Climate change negatively impacts terrestrial, freshwater and marine ecosystems and the communities that rely on them, with some ecosystems projected to turn from carbon sinks into carbon sources. To protect these natural carbon sinks, it is imperative to tackle climate change and biodiversity loss together.

Nature-based solutions offer effective mechanisms for reducing and removing carbon from the atmosphere through the protection, improved management and restoration of nature. Forests, wetlands and grasslands store carbon pulled from the atmosphere in their soil, roots and branches. Researchers estimate that tropical forests hold more carbon than humans have produced over the last 30 years by burning coal, oil and natural gases.

Innovative partnership

Apple has spent the greater part of the last decade working to reach its goal of decarbonizing its entire carbon footprint by 2030, in line with its science-based target and efforts to limit warming by 1.5°C. By the end of 2022, Apple reduced its overall emissions across scopes 1, 2, and 3 by over 45 percent compared with its 2015 baseline year. And looking forward to 2030, it aims to reduce emissions across all scopes by 75% from its base year of 2015.

In more recent years, Apple has sought innovative, high-impact and scalable ways to balance any direct emissions across not just its own corporate operations, but its entire supply chain for its products (scope 3) as part of its 2030 goal. In 2021, Apple partnered with Conservation International and Goldman Sachs to launch the Restore Fund, committing up to USD \$200 million of Apple capital to remove carbon from the atmosphere while generating long-term financial returns. This initial fund pairs carbon credit and revenue generation by focusing on restoring working forests, while protecting and restoring native forests, grasslands and wetlands. In addition to being a co-investor in the fund and an existing partner in Apple's conservation



Photo credit: Arbaro Advisors

efforts, Conservation International is responsible for ensuring that each project meets strict environmental and social standards in addition to the carbon impacts of the fund. Goldman Sachs serves as the fund's investment manager and provides financial and operational due diligence.

In April 2023, Apple expanded the Restore Fund to include another commitment of up to an additional USD \$200 million into a new portfolio managed by Climate Asset Management (a joint venture between HSBC Asset Management and Pollination). Unlike the initial fund, this new commitment decouples financial returns and climate benefits by blending two distinct investment strategies: on the one hand, the vehicle will invest in revenue-generating nature-forward and sustainable agriculture projects; on the other hand, it will originate and invest in high-quality carbon projects that conserve and restore critical ecosystems that are unlikely to generate financial returns.

As part of its 2030 goal, Apple has asked its suppliers to decarbonize their entire Apple footprint by first transitioning to renewable energy to reduce their emissions and improve their energy efficiency. To help with remaining emissions, the Restore Fund also offers Apple suppliers the opportunity to become fund partners and incorporate high-impact carbon removal projects as they decarbonize.

Solution

The Restore Fund aims to remove carbon from the atmosphere each year, while simultaneously introducing a sustainable financial model to increase investment in forest restoration. To foster biodiversity and conservation benefits, the Restore Fund's initial commitment focuses on investments in forestry projects that create buffer zones and natural set-asides to address habitat degradation. By restoring and reforesting lands that can one day become sustainable working forests, this initial fund bundles financial returns and carbon benefits within the same projects.

The Restore Fund's latest initiative with Climate Asset Management takes its focus on conservation value one step further by following its unique blended structure. This structure allows the vehicle to target and provide access to finance for projects that achieve high conservation and climate value but may not have generated a financial return on their own, while earning revenues from agricultural investments, to achieve an attractive overall, blended return on investment.

The Restore Fund presents scalable and financially attractive approaches that aim to address the full potential of nature-based solutions and serve as models that can encourage other businesses to invest in carbon removal and the protection of natural ecosystems globally.

All Restore Fund investments are subject to rigorous social and environmental standards. To monitor and measure each project's impact, Apple uses remote sensing technologies that can build detailed habitat and forest carbon maps. This mapping ensures the assessment of all Restore Fund projects before they receive any investment and the measurement of their carbon removal impact over time. To improve monitoring potential on the ground, Apple is also researching the use of the LiDAR Scanner on iPhone. To ensure Apple's accurate carbon accounting, the Restore Fund follows international standards established by organisations such as Verra, Gold Standard and the Climate, Community and Biodiversity Alliance.

Expected outcomes

The Restore Fund's three initial investments in Brazil and Paraguay aim to restore 150,000 acres of forests and protect an additional 100,000 acres of native forests, grasslands and wetlands. Together with additional projects, the first Restore Fund with Goldman Sachs aims to remove 1 million metric tons of carbon dioxide from the atmosphere per year by 2025. Through the second commitment to the Restore Fund, Apple aims to reduce and remove a further 1 million metric tons of carbon dioxide each year at its peak, while protecting and restoring biodiversity in critical ecosystems.

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Photo credit: Arbaro Advisors

Appendix B. Case Study: *BTG Pactual Timberland Investment Group's Latin America Reforestation Strategy*

*Financing sustainable production, conservation and restoration
in Latin America*

Location

Latin America

Background

Climate change and biodiversity loss continue to negatively impact populations and ecosystems globally. Fortunately, natural climate solutions show great potential to mitigate climate change while also delivering social, environmental and economic benefits alongside financial returns.

Appreciation for the role of natural climate solutions is growing. Unlike other sources of emissions reductions and carbon removal, these solutions are both readily available and cost-effective. Growing consensus suggests that to meet the goals set out by the Paris Agreement and the Kunming-Montreal Global Biodiversity Framework, it is vital to take immediate action to invest in natural climate solutions.

Unfortunately, while the benefits of natural climate solutions are clear, there is still not enough financing going towards these efforts at the scale necessary to make a significant impact. Attracting investments is challenging due to investor unfamiliarity with the asset class, high perceived risks, a lack of investable projects available at institutional scale and over-reliance on carbon markets as a sole revenue source.

Latin America is both vulnerable to climate change and ideally situated to adopt natural climate solutions at scale. It was in this context that BTG Pactual Timberland Investment Group (TIG) developed an impact-oriented reforestation investment strategy in Latin America in 2021.



Photo credit: Filipe Pacetta/Timberland Investment Group

Innovative partnership

A US subsidiary of BTG Pactual, TIG is one of the oldest and largest timberland investment management organizations in the world, overseeing assets and commitments of more than USD \$5.6 billion across 3 million acres. TIG is also a founding member of the Forest Investor Club.

Conservation International (CI), a global environmental non-profit focused on science, policy and partnerships with businesses, governments and communities, is the impact advisor to the TIG reforestation strategy. CI appoints two of the three members of the strategy's Impact Advisory Board, which is responsible for developing impact criteria and monitoring implementation. The aim of the collaboration between CI and TIG is to ensure that the design of the strategy maximizes environmental benefits and can support restoration and conservation at a landscape scale, improving connectivity among areas of natural habitat to support biodiversity recovery.

Solution

The TIG reforestation strategy seeks to acquire close to 300,000 hectares of degraded land in Brazil, Uruguay and Chile and protect and restore half of that area with native cover. In addition, the initiative aims to plant hundreds of millions of trees in commercial forests on the other half of the portfolio, which will be independently certified as sustainably managed by the Forest Stewardship Council. The strategy also aims to improve biodiversity and support community development by promoting inclusivity and equity and to contribute to the body of scientific knowledge about large-scale landscape restoration in the Cerrado region.

While Brazilian law requires that landowners in the region set aside 20% of their area for conservation, TIG's strategy commits 50% of its portfolio to conservation and restoration. Over the life of the strategy, that could amount to nearly 100,000 hectares of additional landscape restoration over and above legal requirements – one of the largest known native forest reforestation programs. With the advice of Conservation International, the strategy aims to leverage private capital to achieve restoration at scale.

Under its reforestation strategy, TIG has already invested in close to 24,000 hectares of previously deforested land in Brazil that can now be conserved, restored and sustainably managed.

Throughout its 40 years of experience, TIG has returned USD \$2.7 billion to investors in its timberland assets. With a long track record, an integrated environmental, social and governance (ESG) framework and well-established strategic collaborations with environmental NGOs, TIG has set itself apart in the industry. Adding to that, TIG applies 10 Stewardship Principles to each potential acquisition, ensuring an extra layer of confidence in its ability to uphold its ESG objectives:

1. We seek to be good stewards, good neighbors, and industry leaders in managing our assets for risk-adjusted returns and positive community, nature, and climate impacts
2. We seek to generate material benefits for communities, nature, and climate, consistently across our portfolio and to protect and enhance ecosystem function
3. We strictly comply with all applicable environmental, social, health and safety, and other laws, regulations, and best practices, including anti-corruption and bribery regulations
4. We seek to certify 100% of eligible assets to independent, third-party sustainable forest management standards
5. We seek to support initiatives that strengthen our values
6. We seek to report ESG performance with clarity and transparency
7. We incorporate environmental, social, and climate risk and opportunity management into investment decisions
8. We respect and uphold human rights across our footprint
9. We seek to develop local supply chains and prioritize local hiring where possible, engaging local communities in our business and supporting rural economic development
10. We support professional growth and development opportunities for all TIG staff and ensure awareness and understanding of our sustainability goals and principles by developing and providing relevant training programs

Expected impact

TIG aims to mobilize USD \$1 billion over five years for the reforestation strategy, with an aim to deliver substantial climate, environmental and social benefits and attractive financial returns for its investors. The strategy aims to generate close to 35 million metric tons of carbon sequestration over 15 years, while re-connecting fragmented habitat through native landscape restoration.

Most recently, in 2023, the U.S. International Development Finance Corporation (DFC) announced its intention to assess potential financing of USD \$50 million to support TIG's five-year reforestation goal. U.S. President Biden made the announcement during the Major Economies Forum on Energy and Climate Change in April 2022 as part of a larger plan to mitigate climate change by scaling forest protection and restoration.

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Appendix C. Case Study: *Conservation International (CI) Ventures*

Investing in businesses that contribute to healthy ecosystems.

Location

Africa, Asia and Latin America

Background

The World Economic Forum ranks biodiversity loss, climate change and extreme weather as the most significant threats to the planet over the next decade.

This is significant because these threaten ecosystem services that provide the global economy with benefits of USD \$125 to USD \$145 trillion per year – more than one-and-a-half times the size of today's global domestic product (GDP).

The global economy, however, has yet to fully value these services. Estimates show the financing needed to protect the most important biodiversity and the services it provides is between USD \$598 billion to USD \$824 billion per year by 2030. This global biodiversity funding gap reflects the challenges governments face in securing and deploying adequate financing to protect nature.

While investments are flowing into biodiversity and nature-based solutions in industries including agriculture and tourism, investors often lack the necessary social, environmental and governance (ESG) expertise to make the business case for protecting biodiversity. Furthermore, while there is increasing appetite from impact and mainstream investors for significant investments in biodiversity, there is still a lack of sufficient catalytic capital to help scale early-stage, nature-positive businesses.

Innovative partnership

Conservation International (CI) is a US-based environmental non-profit committed to protecting nature for people. Conservation International Ventures (CI Ventures) is an impact-first investment fund created by CI in 2018. The fund combines CI's 36 years of climate and conservation science to tackle the biodiversity investment gap and climate-related challenges facing Africa, Asia and Latin America. The fund partners with public and philanthropic investors and invests in early-stage, nature-positive businesses, providing catalytic capital for opportunities that are too early or in special situations where traditional investors can't, while prioritizing impact, offering flexible structures, connecting investees to CI's science and programs where possible, recycling capital into new investments and proving bankability to invite follow-on financing for its investees.



Photo credit: © Alex Bryce, CI

CI Ventures provides loans to small and medium-sized enterprises (SMEs) that operate in the forests, oceans and grasslands where CI works. The strategy ensures the provision of catalytic capital to develop a project pipeline that can achieve sizeable social and environmental impact, while reinvesting financial returns from loan repayments to support more SMEs serving nature, climate and people.

In 2022, CI Ventures, in collaboration with the U.S. International Development Finance Corporation (DFC) and the U.S. Agency for International Development (USAID), set up a loan portfolio guarantee to support critical ecosystems in Mexico, Peru and Colombia where there is a great need for conservation, restoration and sustainable management approaches. The guarantee will provide USD \$5 million in financing for a USD \$10 million loan portfolio.

CI Ventures is committed to promoting sustainability and biodiversity while also improving local livelihoods. As such, investments under the guarantee may include solutions that address mangrove restoration, sustainable livestock, regenerative agriculture, sustainable forest harvesting and ecotourism. USAID will also support the guarantee in the form of technical assistance.

CI Ventures is optimistic that this support will help CI increase social and environmental outcomes and pave the way for additional financing for conservation impact in these countries.

Solution

CI Ventures uses a venture philanthropy model that combines public and philanthropic funding with venture capital. Through its impact investing approach, CI Ventures can invest in companies that other investors might consider too high-risk. One such example is Coast 4C, a social enterprise helping to restore coastal infrastructure for smallholder seaweed farmers following Super Typhoon Rai in the Philippines. Its approach makes CI Ventures uniquely positioned to prioritize impact, strategically time its investments, lead with science and ultimately maximize the impact of every dollar invested.

To be eligible for financing from CI Ventures, enterprises must meet its investment criteria by demonstrating a viable business model, the potential to unlock future follow-on investment at scale and strong management capacity, in addition to alignment with CI's mission to protect nature for the benefit of people and the potential for significant, measurable environmental and social impacts. CI Ventures has also built a strong impact-reporting framework that remains central to its investment process and ensures the continuous monitoring of positive impacts. The program developed its own Impact Pathways approach that draws on its deep expertise in conservation and climate science to track investment outcomes – whether in natural capital, sustainable production or human well-being. By applying a common framework for theories of change, CI Ventures can identify causal links between investments and outcomes. Equipped with a two-tiered monitoring and evaluation structure, CI Ventures can measure both headline indicators and project-level metrics.

In 2022, Environmental Finance named CI Ventures "Small Asset Manager of the Year" for the second year in a row. The fund attributes its success to a unique impact investment approach and strong collaborations with global partners on innovative initiatives.

Expected impact

In its first five years, CI Ventures achieved impressive results from investments in landscapes and seascapes in Peru, Colombia, Ecuador, Kenya, South Africa, Indonesia and the Philippines. The fund executed 34 deals supporting 30 enterprises. In addition to a USD \$12.5 million investment made by CI, CI Ventures mobilized another USD \$86 million in co-financing and follow-on investments. At the close of 2022, the fund had raised USD \$19 million in capital and identified USD \$30 million in eligible near-term pipeline projects.

As its portfolio continues to grow, CI Ventures aims to develop the market for nature-positive investments while working to close the investment gap. Based on results achieved to date, CI Ventures has set its sights on scaling up a USD \$50 million fund. The larger fund would enable it to:

- Execute 200 deals for people and nature;
- Secure co-financing and prompt USD \$700 million in follow-on investments;
- Create 3,000 jobs in nature-based businesses;
- Support 150,000 livelihoods;
- Protect, conserve or sustainably manage 500,000 hectares of natural habitat.

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Appendix D. Case Study: *Lombard Odier Investment Managers New Food Systems Strategy*

Harnessing opportunities aligned with the transition to more sustainable food systems

Location

Global (including emerging markets)

Background

Food systems are accelerating the transgression of several of the nine planetary boundaries that regulate the stability and resilience of the Earth system. These nine planetary boundaries are vital to ensuring that humanity and economic systems can continue to develop and thrive for generations to come. Crossing them could generate irreversible environmental changes.

The agriculture, forestry and other land uses (AFOLU) sector accounts for 24% of greenhouse gas (GHG) emissions, 90% of forest degradation, 70% of freshwater supplies and 25% of biodiversity loss. There is general agreement that to address the negative effects of food systems, it is vital to restore 1 billion hectares of degraded land by 2030, which implies reducing agricultural land by 20%. Some 115 countries have already shown support for this commitment through climate and biodiversity pledges. In addition, current food systems generate an estimated USD \$12 trillion annually in hidden environmental, health and poverty costs.

In order to sustainably and safely feed 10 billion people by 2050, food systems will have to undergo a sustainable transformation, drastically changing the way food is produced, distributed and consumed.



Innovative partnership

Lombard Odier Investment Managers (LOIM) has partnered with system change firm Systemiq to build holistiQ Investment Partners ("holistiQ").* holistiQ operates as an investment platform within LOIM, aiming to deploy capital for a net-zero and nature-positive economy. One of holistiQ's pillars is nature-based solutions, which includes opportunities across the Global South.

holistiQ brings an integrated approach to investment management, combining analysis of the commercial, environmental and societal factors that will shape the sustainability transition. As a research-driven platform, holistiQ has more than 100 professionals dedicated to translating its science-based quantitative research on the transformation of key economic systems – such as energy, land and oceans and materials – into investment strategies for clients. Its research-based investments, focused on unlocking the profit pools of the transition, aim to accelerate the emergence of sustainable, regenerative, nature-positive economic systems.

* holistiQ Investment Partners ("holistiQ") is a LOIM platform powered by a partnership with Systemiq and was announced on 6 June 2023. holistiQ is a trading name of LOIM and is not a legal partnership or other separate legal entity.

Solution

LOIM launched the New Food Systems strategy on 7 July 2022. It is now part of the holistiQ platform alongside four other sustainability-driven strategies.

The objective of the New Food Systems strategy is to invest in a food system that can meet the nutritional needs of a growing population, within the constraints of planetary boundaries. The strategy seeks to invest in public equities globally that develop and mobilize new forms of healthy and sustainable protein, new agricultural practices and new delivery models.

The key investment impact themes for the investment strategy were defined based on sustainability-driven inflection points and shifting profit pools:

1. **Sustainable food production:** Companies that produce biological and synthetic inputs and food products (like aquaculture, animal feed and health, fertilizers, agricultural products, food additives and ingredients).
2. **Enabling solutions:** Companies that provide specialized enabling products and services along the value chain (such as farming equipment, life sciences, enabling technologies, food packaging and logistics and delivery).
3. **Sustainable food consumption:** Consumer-facing companies, manufacturing, retailing and serving food (for instance, food manufacturing, retailers and restaurants and canteens focused on distributing tomorrow's diets).

A diversified portfolio is constructed from companies with material exposure to these investment themes and by screening based on a clear set of financial, environmental and social criteria.

Expected impact

The New Food Systems strategy is part of holistiQ's broader mission to drive large-scale capital investment to shape a net-zero and nature-positive economy. The strategy aims to invest in the transformation of the sustainable food value chain, favoring companies that enable solutions across the value chain in industries such as farming and food equipment, food packaging and logistics and consumer-facing companies that promote sustainable consumption.

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Appendix E. Case Study: *Mirova Land Degradation Neutrality Fund*

Facilitating sustainable land use and land restoration investments

Location

Africa, Asia and Latin America

Background

With the global population set to surpass 9 billion by 2050, finding a sustainable approach to managing land use has become critical. In the last two decades alone, the world has lost more than 25% of arable land, equating to roughly 2 billion hectares. Estimates show that an additional 12 million hectares of productive land are lost globally each year. In fact, according to the European Commission's 2018 edition of the *World Atlas of Desertification*, 75% of the Earth's land area has been degraded – a figure that could reach 90% by 2050.

Due to the far-reaching implications of land degradation on food security, livelihoods, climate change, biodiversity and the Earth's ecosystems, there is an urgent need for long-term financing solutions that reduce and reverse land degradation. Land degradation neutrality, a target adopted by the SDGs (target 15.3) and other initiatives, highlights the need to use sustainable land management (SLM) practices to avoid additional social, ecological and economic capital damages. Landscape restoration and agroforestry are two SLM practices that show significant promise from a responsible land-use perspective and due to the environmental and social benefits that result.



Photo credit: Kenemer Foods International

Innovative partnership

The Land Degradation Neutrality (LDN) Fund is a first-of-its-kind impact investment fund designed to facilitate sustainable land use and land restoration investments and contribute to the larger LDN concept. The United Nations Convention to Combat Desertification (UNCCD) initiated the fund and Mirova acts as the fund's independent manager. The Sustainable Trade Initiative (IDH) manages an associated donor-funded technical assistance (TA) facility that aims to expand positive development impacts, decrease environmental, social and governance (ESG) risks and enable knowledge sharing. The French Development Agency (AFD) and the Global Environmental Facility (GEF) provide donor contributions to the TA facility.

To oversee each investment using the approved SDG 15.3 metrics (and other social and environmental indicators), Mirova and IDH have partnered with Conservation International to create a measuring toolkit specifically focused on indicators for land productivity, land cover and soil organic carbon.

Since its final closing in March 2021, the LDN Fund has secured USD \$208 million in investment commitments from public sector partners (including the French Development Agency (AFD), the European Investment Bank, the UK Department for Environment, Food and Rural Affairs (DEFRA), Global Affairs Canada and the Government of Luxembourg) and private sector partners (such as Allianz, BNP Paribas Cardif, Fondation and Natixis Assurances).

Solution

As an innovative financing vehicle, the LDN Fund provides long-term financing (debt and equity) to projects and companies in the agroforestry, forestry and regenerative agriculture sectors, as well as other land-based activities.

To reach the SDG target of achieving LDN by 2030, private sector investments (in addition to public resources) are necessary. This is where the LDN Fund comes in. It leverages public resources to catalyze the large pool of private capital available. At present, the fund has invested in 10 companies in Africa, Asia and Latin America, with a number of other projects under active consideration. It evaluates projects based on their economic profitability (operational robustness and financial viability), environmental and social impact, and risk management.

While the LDN Fund focuses solely on developing countries, the scope of investments is global, ensuring it is well-diversified between different sectors, business models and regions. To appeal to private investors who normally wouldn't invest in SLM projects (such as pension funds, insurers and other institutional investors), the fund relies on a layered capital structure, offering appropriate risk-return profiles for two investment classes:

1. Junior investors that take a first-loss position, prioritizing environmental and social impacts over financial returns (i.e. public organizations);
2. Senior investors that seek market financial returns with a low-risk profile, wishing to diversify their portfolio and invest in real assets (i.e. institutional investors).

The LDN Fund TA facility, which provides grants to assist projects seeking LDN Fund investments, has four key workstreams:

1. Pre-investment stage project design support;
2. Post-investment assistance to projects in the implementation phase;
3. Impact monitoring;
4. Sharing of lessons learned and knowledge from successful sustainable land management investment models.

Expected impact

By investing in SLM and land restoration projects, the LDN Fund is set to deliver positive environmental and socio-economic impacts, in addition to financial returns. With its focus on land degradation, the LDN Fund aims to achieve targets of 350,000 hectares under sustainable land management, 70,000 jobs provided by its investments and 25 million metric tons of CO2 sequestered.

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Photo credit: Mirova

Appendix F. Case Study: *New Forests African Forestry Impact Platform*

Turning plantation forestry in sub-Saharan Africa into an asset class that can attract private investment

Location

Sub-Saharan Africa

Background

Africa is home to 17% of the world's forests. Roughly 60 million people directly rely on these forests, while over 60% of Africa's population indirectly depends on them. Sadly, the continent lost 4.4 million hectares of forest per year from 2015 to 2020.

Forests and landscapes are known for protecting wildlife from natural disasters and providing communities with shelter, food, fuel and other essential products and services. When their existence is threatened, human civilization pays the consequences.

As Africa's economy and demand for timber both grow, a solution to protect its biodiversity-rich forests is vital. Forest conservation and restoration are critical to mitigating these pressing issues.

Innovative partnership

Against this backdrop, New Forests, along with its three development finance institution (DFI) investment partners – British International Investment (BII), Norfund and Finnfund – have signed subscription agreements for their investment of USD \$200 million in a dedicated African fund – the African Forestry Impact Platform (AFIP). This agreement follows an earlier announcement of intention made at the United Nations Climate Change Conference (COP26) in Glasgow for the group to partner to develop investment strategies designed to scale and transform the sustainable forestry sector in sub-Saharan Africa.

The four partners also announced AFIP's first acquisition, Green Resources, which is East Africa's largest forest development and wood processing company. Green Resources manages some 38,000 hectares of plantation forest throughout Mozambique, Tanzania and Uganda. Norfund and Finnfund have invested in Green Resources since 2019 and as part of the latest agreement, they have reinvested the capital from the sale of Green Resources into AFIP, while attracting new capital from BII.



Photo credit: New Forests

Headquartered in Australia, New Forests has been managing forestry assets for nearly 20 years, and recognizes the DFI partnership as an excellent cornerstone investment for AFIP to help scale and transform the forestry sector in sub-Saharan Africa. New Forests looks to leverage this partnership to attract private capital, although securing institutional investments comes with its own set of challenges. Unlike developed markets, where there is a more substantial likelihood for scalability, the plantation market in sub-Saharan Africa has yet to reach a similar risk-return profile and scale. Instead, plantation assets operate in silos, unable to realize attractive financial returns and social impact without significant risks, specifically reputational risks.

By combining capacity and management units, AFIP aims to show how to turn plantation forestry in sub-Saharan Africa into an asset class that can attract private investment. Since AFIP also seeks ambitious social and environmental returns, the platform is an open-ended vehicle attracting permanent capital, with the goal of finding a long-term solution to address some of the historical forestry investment-related challenges in Africa by operating a landscape approach. New Forests is exploring other forms of capital (such as impact and catalyst capital) to further invest at a landscape level. This approach would relieve the plantation forestry business from needing to invest a significant percentage of its annual budget to achieve environmental and social outcomes, which the catalytic capital investment could help achieve.

While New Forests is eager to pursue this approach, as the fund manager, it recognizes that deploying alternative finance at scale requires a specific skillset. Given its risk appetite, large portfolio and the level of due diligence required for each company to deliver social and environmental outcomes at a landscape level, New Forests is exploring partnerships with private sector partners who share their vision and who could help deploy the catalytic capital and achieve the expected impact.

Solution

AFIP aims to help reduce increased pressure placed on forests in Africa while supporting the sustainable growth of the plantation forest sector. It seeks to achieve these goals through initiatives that support forest conservation, degraded land restoration and the expansion of community-based forestry programs. Furthermore, AFIP offers a clear pathway to sustainable landscapes, improving production systems while ensuring conservation. AFIP also aims to increase funding for nature-based solutions, grow the supply of sustainable wood, restore natural capital and improve local job opportunities.

Over the next two to three years, AFIP aims to raise USD \$500 million to support the sustainability and development of Africa's expanding forestry sector. This is in line with its goals to secure long-term institutional capital. By investing in a portfolio of plantation forestry operating companies and related assets in sub-Saharan Africa, AFIP can target established assets that it expects will offer stable and predictable cash flows across diversified markets. It is important to note that any carbon revenue on top on this strategy would be additional. Against this background, AFIP is currently focusing on consolidation, showing that there is a reliable market, that the strategy is scalable and that it can minimize risks through scale.

AFIP will also draw on technical assistance from Partnerships for Forests, a UK Foreign, Commonwealth & Development Office funded program. Partnerships for Forests will work closely with AFIP to identify and develop new business models that work for plantations, while generating tangible returns for investors and delivering social and environmental value to smallholders and other landscape stakeholders.

Expected Impact

AFIP aims to address two social and two climate impact targets that are directly linked to its carried interest at year 10:

1. Biodiversity (increase quality habitat by 14%);
2. Carbon sequestration (reduce emissions and increase 2.26 million tons net);
3. Gender (80% of the portfolio needs to be compliant with 2X Global's 2X Challenge criteria);
4. Improved and alternative livelihoods (increase the number of livelihoods improved or alternative ones provided by 14%).

AFIP plans to create a baseline for each new investment across all four impact targets, followed by an approved methodology. It will cap the portfolio at year four and measure it again at year 10.

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Interview with Stephanie Bishop (Environmental and Social Associate Director), New Forests.



Photo credit: New Forests

Appendix G. Case Study: &Green Fund Advised by SAIL Ventures

Mobilizing capital to achieve inclusive supply chains and sustainable land use

Location

Tropical regions of Latin America, Africa and Southeast Asia

Background

As the global urgency to address climate change and biodiversity loss becomes more pronounced, the planet's natural ecosystems continue to disappear rapidly. In 2020 alone, the world lost 4.2 million hectares of primary forests and 12.5 million hectares of tree cover in the tropics. Pressured to answer global demand for their goods, agri-commodity businesses continue to expand their land, thus worsening the already heightened deforestation crisis.

The agriculture sector is at a crossroads, with the potential to move from contributing to the deforestation and biodiversity loss problem to becoming responsible for its solution. By applying sustainable and inclusive practices, agri-commodity businesses have the unique opportunity to positively impact supply chains while they simultaneously combat climate change and safeguard biodiversity.

For those businesses that already recognize the need to adjust their approach, the challenge is to find the necessary capital and technical expertise to ensure a smooth transition to more sustainable practices.

Innovative partnership

It is against this backdrop that IDH – The Sustainable Trade Initiative, working in close collaboration with the Norwegian Government through Norway's International Climate and Forest Initiative (NICFI), developed &Green in 2017. &Green is a private debt investment facility designed to delink commodity supply chains from deforestation in a manner that is both commercially viable and replicable as a model.

&Green recognizes the potential for agri-commodity businesses to access environmental and social returns, while also generating attractive financial returns. The fund's primary focus is to protect tropical forests and peatlands susceptible to degradation and deforestation. To do so, it invests in active commodity sectors, such as beef (livestock), palm oil, soy and forestry (including rubber).



Photo credit: SAIL Ventures

&Green has raised USD \$180 million in committed capital from its six main contributors (NICFI, Unilever Group, the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP), FMO (the Dutch Entrepreneurial Development Bank), Mobilising Finance for Forests (MFF) and the Ford Foundation) in the form of grants, redeemable grants and loans.

&Green aims to reach USD \$1 billion in assets under management over the next 10 years. To that end, &Green is now strategically using public capital to design innovative financial instruments that de-risk investments and leverage private capital from institutional investors.

Solution

&Green is specific in its focus as an investor, seeking out businesses directly and indirectly involved in the production of goods within the fund's approved jurisdiction (tropical regions of Latin America, Africa and Southeast Asia). By first identifying businesses that strongly align with the fund's central objectives of decoupling deforestation from key commodity supply chains, &Green can finance the transition of these supply chains from extractive to genuinely sustainable models that are adoptable, replicable and scalable.

There are three commitments that &Green requires from its prospective clients that simultaneously support their operational transformation and increase their attractiveness to future investors: a No Deforestation, No Peat and No Exploitation (NDPE) Policy; an Environmental and Social Action Plan (ESAP) and a Landscape Protection Plan.

The fund draws on its raised capital, expertise and partnerships to build an investment blueprint and mobilize private capital, helping its clients contribute to more inclusive supply chains, sustainable land use and commercial goals that drive transformational change on a global level.

&Green expects significant environmental returns from its clients' projects, which it tracks over the entire investment period. To safeguard the outcomes of each project, &Green has developed a technical assistance (TA) budget that aids current and prospective clients in preparing their eligibility for an investment through the fund. These TA initiatives can operate in conjunction with the investment process, whereby clients must meet &Green's environmental and social management system (ESMS) standards to qualify for financing.

&Green offers its clients affordable, long-term (5-15 year) credit facilities and guarantees ranging from USD \$5 million to USD \$ 30 million. &Green's structuring and risk management expertise allows the fund to effectively manage and reduce the credit risk of its investors while providing attractive risk-adjusted returns. The fund is also capable of bearing greater short- and medium-term risks, allowing the credit to support lower cash flow needs during each project's initial years. This helps offset some of the client's upfront costs associated with the project's environmental and social criteria requirements.

Expected Impact

To achieve its mission to protect the world's tropical forests and continue to grow its portfolio of committed clients, &Green has put several measures in place:

1. It has integrated a key performance indicator (KPI) framework into its investment process to track, report and confirm the progress of each project's anticipated change targets.
2. It assigns each client an ESAP that outlines distinct measures for on-the-ground execution, along with impact evaluation performance indicators.
3. It refers to a Forest & Biodiversity Framework to guarantee a project's adherence to the International Finance Corporation's biodiversity-related Performance Standard 6 and other relevant certification standards where applicable. To ensure ongoing monitoring and verification, &Green relies on satellite data, client self-reporting, verification from local NGO partners and visits from Sail Ventures.

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Interview with Michael Schlup (Head of Impact and ESG, Managing Director), Sail Ventures



Photo credit: SAIL Ventures

Appendix H.

Forest Investor Club Investment Principles

1

Environmental, social and governance (ESG) and impact considerations should be incorporated throughout the investment cycle

ESG and impact considerations (namely related to climate, nature and people) should be incorporated throughout the entire investment cycle (from the identification of investment opportunities all the way to exit) and across asset classes. This may also include the incorporation of ESG and impact considerations into policies, strategies, tools, etc., as well as when assessing the capabilities of internal and external investment managers and service providers and support FMs to proactively monitor operational performance and contribute to achieving and sustaining low carbon operation.

2

Investment strategies should seek to achieve financial sustainability

Investment strategies should seek to achieve financial sustainability to allow forests, nature and related sustainable land-use investments to:

- i. Become a mature asset class that is scalable and
- ii. Contribute their full potential to achieving the targets of the United Nations Sustainable Development Goals (SDGs), the Paris Agreement and the Kunming-Montreal Global Biodiversity Framework.

3

Investment strategies should meet rigorous, science-based environmental and social standards

Investment strategies should apply the "Do No Harm" principle. Similarly, investment strategies should meet rigorous, science-based social and environmental standards in accordance with international best practices, such as the International Finance Corporation's Environmental and Social Performance Standards. Investment strategies should ensure that they duly manage social and environmental risks (e.g., risk management, labor, resource efficiency, community, land resettlement, biodiversity, Indigenous communities and cultural heritage).

4

Nature-based carbon strategies should align with leading voluntary carbon market (VCM) initiatives

Investment strategies should align with leading VCM initiatives to ensure high-integrity demand for high-quality projects that contribute to mitigating climate change, promoting biodiversity conservation and supporting sustainable development and livelihoods for local communities and Indigenous communities. Some of these VCM initiatives may include the Voluntary Carbon Markets Initiative (VCMI) and the Integrity Council for the Voluntary Carbon Market (ICVCM).

5

Investment strategies should be based on evidence, sustainable and mainstreamed within an appropriate jurisdictional context

Investment strategies should have a theory of change (based on scientific evidence) and apply adaptive management principles throughout the investment cycle to ensure long-term sustainability. Investment strategies should also aim to align with policy and regulatory frameworks and national and global commitments when feasible. To facilitate the scaling of investments in nature-based solutions (NbS), FIC members should aim to share, to the extent possible, lessons learned arising from the design and implementation of such solutions.

6

Investments should promote inclusive and transparent governance processes

Investments should have inclusive and transparent governance processes in place to reduce sustainability risks and strengthen their "social license to operate". This should include the availability and accessibility of appropriate grievance mechanisms, where the participation of all stakeholders is based on mutual respect and equality. Similarly, decision making processes should address the rights and interests of all the stakeholders involved within and beyond jurisdictional boundaries (e.g., transboundary agreements).

7

Investment strategies should have a robust impact measurement and management system and provide independent verification (when feasible)

Investment strategies should have a robust impact measurement and management system in place, which should include a clear definition of the impact strategy (e.g., goals, targets, etc.), measurement, monitoring, reporting (e.g., comparing and communicating performance) and verification. Investment strategies should provide independent verification when feasible.

8

FIC members should disclose and report ESG issues and impacts of their operations and their portfolio companies

FIC members should disclose and report ESG issues and impacts (namely related to climate, nature and people) of their operations and their portfolio companies, specifically when linked to FIC-related activities. This should include how they integrate ESG issues and impacts across the entire investment cycle, policies, strategies, etc., as well as what they require of service providers, portfolio companies, etc.

Appendix I.

Joining Forest Investor Club

The Forest Investor Club (FIC) is open to considering new Members and Network Partners. As a Member or Network Partner, organizations can enjoy several benefits:

- The ability to prioritize, shape and access tools and resources developed by FIC to understand and unlock investment, including new approaches to addressing barriers to investing at scale;
- Opportunities for investment and partnerships that enable investment, with support in matching members with relevant investments and partners;
- A pre-competitive space for knowledge sharing to help navigate forest and nature investments in frontier and emerging markets;
- Thought leadership opportunities and recognition as part of an influential network of peers working on the same challenges.

The main distinction with becoming a member organization is the intent to actively deploy capital for nature-based solutions (NbS). Network Partners, on the other hand, are alliances/ platforms, technical service providers, project developers, NGOs, research institutions and international organizations that provide technical advice on NbS investment, access to a potential pipeline of investment opportunities and alignment with complementary efforts to scale investments.

Currently, there is no cost to join FIC and it is not necessary to be a WBCSD member. FIC Members must align with a set of membership requirements, including:

- Supporting the Forest Investor Club Vision – that forest, nature, and related sustainable land-use investments in frontier and emerging markets become a mature asset class, contributing their full potential to achieving the United Nations Sustainable Development Goals and the targets of the Paris Agreement and the Kunming-Montreal Global Biodiversity Framework;
- Aligning with a set of Principles for Investing in Nature-based Solutions ([see Appendix H. Forest Investor Club Investment Principles](#));
- Actively engaging in Member calls (organized at a minimum every two months), designed to provide updates, share knowledge, gather feedback and further FIC's work;
- Reporting on progress as part of annual reporting for FIC.

For more information about the Forest Investor Club, contact Ben Cohen, Senior Manager, Forest Investor Club at cohen@wbcsd.org.



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Disclaimer

This report is released in the name of WBCSD. Like other reports, it is the result of collaborative efforts by WBCSD staff and experts from member organizations. Forest Investor Club (FIC) participants reviewed drafts, ensuring that the report broadly represents the majority of project members' views. It does not mean, however, that every Member or Network Partner of FIC agrees with every word.

About the Forest Investor Club (FIC)

Launched by the U.S. Department of State and led by WBCSD, the Forest Investor Club is a network of public and private sector financial institutions, companies and investors committed to accelerating the deployment of capital into the protection, restoration and sustainable management of forests and nature. It catalyzes investments that reduce emissions and enhance carbon sequestration by supporting members through additional access to investment pipelines, facilitating complementary partnerships to de-risk and increase access to capital and developing solutions to overcome investment barriers.

www.wbcsd.org/Focus-Areas/Forest-Investor-Club

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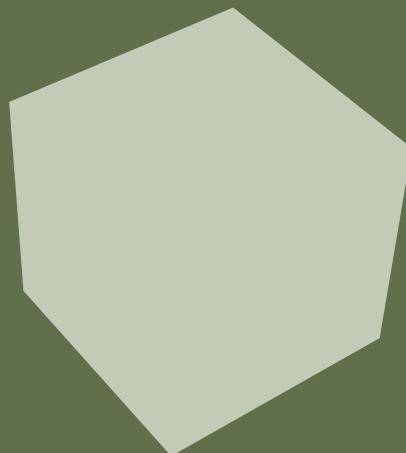
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FOREST DECLARATION ASSESSMENT SPECIAL REPORT

Emerging forest finance instruments

September 2024



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1. Introduction



Forests play a vital role in sustaining Earth's systems: they regulate the climate, protect biodiversity, maintain the carbon cycle, and support human livelihoods. These ecological services provide a wealth of economic benefits. The UN estimates that forests directly generate USD 250 billion in economic activity each year, rising to as much as USD 150 trillion per year when carbon sequestration potential is included.¹ Finance for forests can, accordingly, provide benefits above and beyond direct forest protection, contributing to broader climate, environment, and sustainable development goals.

The forest finance landscape

Despite these benefits, a far greater volume of finance is provided to activities that threaten forests rather than to those that benefit them. International pledges to protect, conserve, and restore forests ("green" finance) from 2021-25 amount to just USD 29 billion, averaging less than USD 6 billion per year.² By comparison, flows of public finance for activities with the potential to drive deforestation or forest degradation ("gray" finance) are much larger in magnitude. From 2013-18, gray public finance flows were estimated to range between USD 378 to USD 635 billion per year, globally.³ Private investment and spending that support forest-risk activities remain significant; an analysis by Global Canopy in 2022 found that private financial institutions were providing USD 6.1 trillion in active financing to companies most exposed to deforestation risk in their supply chains.⁴

There is an acute need to shift finance flows away from harmful business-as-usual land use activities, toward sustainable and climate-compatible land management,⁵ as well as to increase the volume of finance flowing to activities aligned with forest objectives. Direct grantmaking via international development aid, multilateral institutions and philanthropies has provided

a necessary lifeline for forests in recent decades, but these funds remain vastly insufficient. The investment gap in nature and forests cannot be closed through public funding alone. Yet, a lack of incentives, regulatory pressure, and available investment opportunities hinders increased action by private actors.⁶

Why forest finance has fallen short

Under the dominant economic paradigm, forests are considered more profitable when destroyed than standing.⁷ In many parts of the world, the value of forest ecosystems – and associated land use and investment decisions – has been traditionally based on the materials that forests generate for human production and consumption. The benefits provided by standing forests, as well as the costs associated with their degradation and loss, have not been considered or prioritized.⁸

In many forest regions, there are strong economic incentives to convert forests to alternative land uses that can provide more immediate and short-term profits, as well as tax revenues and jobs. This includes, for instance, commodity agriculture and mining for metals and minerals. Short-term profit-seeking can also lead to unsustainable forest management for timber production. The negative externalities of these activities, which can include deforestation, loss of biodiversity, and ecosystem services, have long-term impacts on local communities and environments and are usually not reflected in the market prices for the goods produced. In addition, large-scale infrastructure development often fails to fully account for ecosystem impacts or provide commensurate investments in sustainable local economies.⁹

Historically, high-income, industrialized nations have pursued development pathways that rely on unsustainable exploitation of natural ecosystems.

Today, governments in lower-income countries with rich forest ecosystems are faced with the challenge of pursuing economic growth without following these same destructive pathways. In addition, high levels of debt plus social, economic, and environmental challenges often leave little public budget to spare for governments to explore new economic development pathways that align with global forest goals. Many countries most in need of additional finance to protect, restore, and sustainably manage their natural ecosystems are also those most impacted by climate change.^a

At the same time, international forest finance has historically been donor-driven, rather than forest country-led. As a result, it often reflects the priorities and perceptions of outsiders and does not transfer easily into other cultures or informal economies.¹⁰ Even when financing is made available, it can be difficult to access due to bureaucracy and complicated fiduciary requirements, or it may be partially absorbed by a range of intermediaries before reaching its intended organizations.¹¹

About this paper

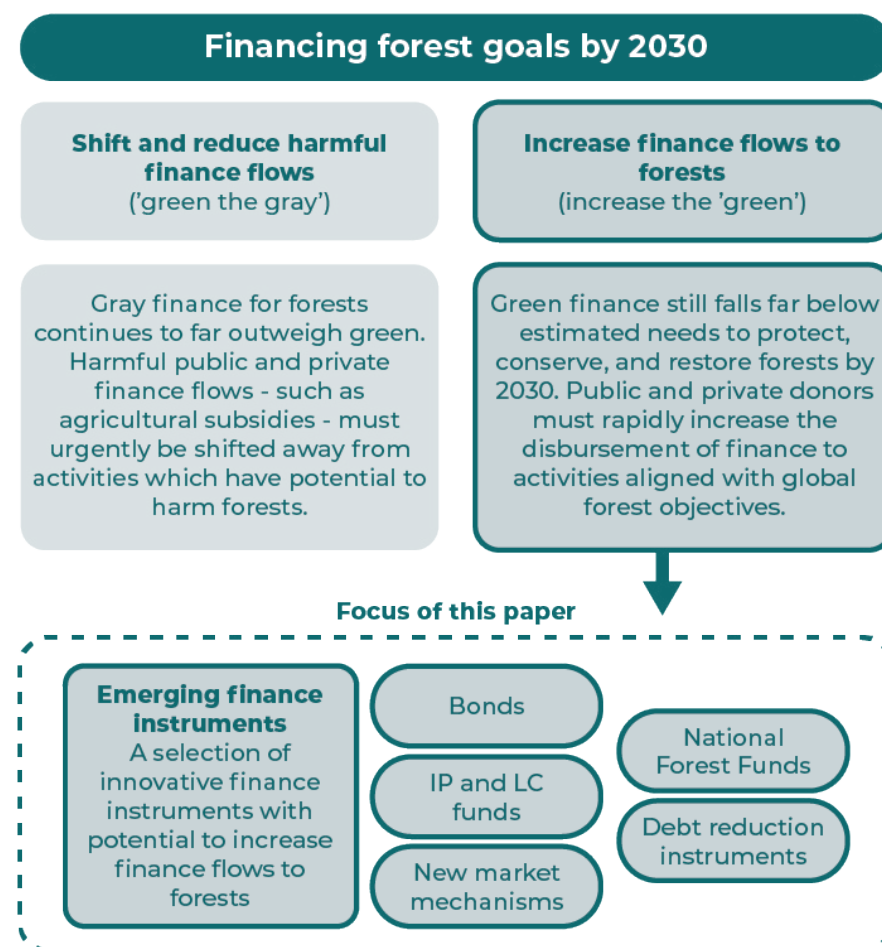
In the last few years, a plethora of new public and private initiatives have emerged with the potential to contribute to the goal of ending and reversing forest loss by 2030, as set out in the Glasgow Leaders' Declaration on Forests and Land Use.¹² Innovative financial instruments are being designed to blend financing from different sources, reduce risks for investors, crowd in private finance, and improve access to financing for Indigenous Peoples and local communities (IP and LCs). At the same time, a number of forest country governments have developed dedicated finance mechanisms. This brief provides a summary of several emerging financial instruments, including the financing barriers they can help to tackle, and any lessons learned from real-world use cases.

The finance mechanisms covered in this brief address one aspect of the forest finance challenge. Achieving global forest goals by 2030 requires a

^a For instance, the cost of debt from public and private creditors across the Vulnerable Twenty Group (V20) has increased by USD 62 billion compared to the previous decade and is expected to further double in the upcoming decade. See Alayza, N., Laxton, V. and Neunuebel, C. (22 September 2023) Developing Countries Won't Beat the Climate Crisis Without Tackling Rising Debt. WRI Insights. <https://www.wri.org/insights/debt-climate-action-developing-countries>.

two-pronged approach: firstly, we must shift and reduce the vast quantities of gray finance, such as agricultural subsidies, which are directly and indirectly driving forest destruction and degradation. Secondly, we must increase the commitment and disbursement of new green finance for forests, using innovative approaches to increase private sector engagement and create new, stable forest funding streams. This brief focuses on the latter (**Figure 1**).

Figure 1. Overview of forest finance flows and focus of this paper.



2. Forest finance instruments



Bonds

Forest funds

Debt reduction instruments

New market-based mechanisms

Indigenous Peoples and local community-led funds

In the following sections, we explore different types of emerging financial instruments one-by-one, before reflecting on the necessary enabling conditions for these instruments to help deliver on global forest goals and proposing higher-level recommendations for their implementation. For each instrument, we consider the following:

- The range of instruments covered by each category
- Forest financing barriers the instrument(s) can help to address
- Which stakeholder groups the instrument(s) are suitable for
- Potential implementation challenges
- Potential issues or concerns around the instrument's use

Where data allows, we also consider the type of forest activity the instrument is typically used to support and how much financing has been disbursed through the instrument to date.

After introducing each category of financing instrument, we take a deep dive into real-world uptake. **Section 3** presents 2-3 case studies for each instrument category, illustrating how the instruments have been deployed in different contexts to deliver on different forest objectives. Case studies were selected for their level of innovation or for the valuable lessons they can provide to future implementers of that instrument.

2.1 Bonds

Bonds are a type of ‘fixed-income’ instrument issued by governments, corporations, and other organizations. Bonds are bought by various types of investors, who commit to lending money to the issuer over a set period in exchange for regular interest payments. Bonds are one example of a financial instrument that can facilitate the delivery of funding to activities where risk, whether real or perceived, hinders private sector investment.¹³

While bonds are not a new instrument, the landscape of different bond types – particularly those designed to deliver on environmental objectives – has expanded over the past decade. Examples include:

- Green bonds: fixed-income instruments with proceeds earmarked exclusively for projects with a positive environmental impact
 - Forest bonds: fixed-income instruments with proceeds earmarked exclusively for forest-supportive activities
- Sustainability bonds: debt instruments that raise money to finance or refinance a combination of green and social projects
- Sustainability-linked bonds: performance-based bonds designed to deliver finance upon the achievement of key performance indicators

Green bonds are the most common and most documented of all bond types used for sustainability objectives. Green bonds have been used since the late 2000s, initially for investments in renewable energy and water infrastructure, but in recent years, for a broader range of environmental activities including climate adaptation, waste reduction, or forest protection. Green bonds were traditionally issued by governments or central banks but are increasingly being issued by other entities – including corporates and subnational entities – seeking ways to raise money to finance their environmental goals.

Forest bonds, a much newer and narrower instrument, are solely used to finance forest-supportive activities. While the use of forest bonds as a tool for leveraging forest finance is explored in literature and theoretical structures have been designed for their issuance,¹⁴ there is limited evidence of real-world implementation. The **section 3** case studies present a few examples of uptake, including a sovereign sustainability bond implemented in Brazil to raise finance for domestic environmental projects (**Case study 1**); a forest bond designed to raise money for forest restoration in California’s Tahoe Forest (**Case study 2**); and a blended finance mechanism being used to support the development sustainable supply chains in the Amazon (**Case study 3**). These examples illustrate how bonds can be used in a variety of public and private financing arrangements to leverage finance for a wide range of forest objectives.

Barriers addressed

Bonds can help to tackle key barriers for both public and private actors, and as a result, can be a vital tool for addressing the forest financing gap. For issuers, green bonds can be an effective way to attract and diversify investment, particularly for governments. Bonds help to reduce investment and financing risk: by ‘lending’ funds to the bond issuer, investors avoid being directly exposed to any financial risks presented by the project. Such risks may include high local currency borrowing rates and foreign exchange risk, especially in developing countries.¹⁵ Bonds used to support multiple different projects can also help to spread and reduce (perceived) investment risks. For corporate or other private issuers, bonds can be useful tools for addressing upfront finance needs – such as for projects with short-term returns¹⁶ – a particular issue for small-scale actors who seek to implement forest carbon projects.¹⁷

For investors, bonds offer financing opportunities that can contribute to their ‘green’ objectives, while also delivering stable returns. This is particularly unique in the forest funding landscape, where investment opportunities with financially stable and attractive returns are rare. When they are provided, returns rely on ecosystem service markets – such as carbon or biodiversity credits and other ways to generate financial value from ecosystem services – and returns from capitalizing on forest-friendly commodities, which is still limited.

Uptake to date

Bonds are increasingly used in blended financial arrangements – approaches to financing sustainable development that involve leveraging public and/or philanthropic capital to raise private finance.¹⁸ However, the uptake of blended finance in the forest context has so far lagged.¹⁹ There is a tendency for blended finance to be directed toward lower-risk projects with a solid business case, such as infrastructure and energy.^{20,21} Nonetheless, it is increasingly documented in literature as a promising tool for bringing together public and private finance for forests.²²

It is estimated that approximately USD 4.4 trillion in green, social, sustainability, and sustainability-linked bonds (GSSS) has been issued globally since the first green bond transaction in 2012. To date, advanced economies have accounted for 70 percent of all GSSS issuances, with financial institutions

and sovereigns contributing the majority.²³ The World Bank reports that, since 2008, it has committed USD 19.5 billion in green bonds. A total of USD 12.3 billion has been dispersed across 126 projects in 35 countries, of which USD 3 billion went to the agriculture, land use, and forestry sectors.²⁴ In 2017, the World Bank reported that just 2 percent (worth a total of USD 2.5 billion) of all active Green Bonds were issued in the forestry sector.

Malaysia is set to launch one of the world’s first major forest bonds, a sovereign biodiversity *sukuk* – a financial bond that aligns with Islamic principles – due for release in late 2024. The bond is designed to address Malaysia’s domestic forest restoration objectives as well as demand from ESG-focused investors. It will be used to fund reforestation and restoration projects through the generation of carbon credits. The bond is worth approximately USD 210 million and will be funded from Malaysia’s national budget.²⁵

In August 2024, the World Bank launched the Amazon Reforestation-Linked Bond, which will support reforestation activities in the Brazilian Amazon. Expected to mobilize USD 225 million, a unique feature of this bond is it links financial returns to how much carbon is successfully removed through restoration. The bond is listed on the Luxembourg Stock Exchange and will mature in 2033.²⁶

Key considerations

- During bond design, the various barriers that may hinder stakeholder engagement should be considered. For private actors, which includes investors as well as corporate issuers, barriers can include high transaction costs, credibility concerns, commercial and market risk, and limited investor demand.²⁷ For public actors, primarily government issuers, barriers relate to the suitability of the instrument. The suitability of a bond depends on the country's financial stability, political risks, and forest policy. The issuing government must be able to effectively absorb and manage large influxes of upfront finance, as well as have the resources to repay finance over the long term. For many forest countries that are already heavily indebted, such an instrument may not be suitable.²⁸
- Bond implementers should be prepared for different stakeholders to engage at different stages. Impact and socially responsible investors are more likely to accept lower returns and invest in new bonds, while institutional investors will more likely be attracted to already-established bonds.²⁹
- While any of the bond types listed above may be used to finance forest-supportive activities, they may also be used to fund land-based activities that have negative, indirect impacts on forests. For example, green bonds may be used to fund biofuel or forest supply chain projects which, while classified as green projects, may increase pressures on local forests and forest resources. In general, the absence of global, mandatory standards or certification for green bonds can present risks of greenwashing, and potential real risks to the environment. Taking a landscape approach to bond implementation can help to mitigate any adverse impacts.

2.2 Forest funds

Forest funds are financing instruments through which dedicated funding is set aside to support the conservation and sustainable use of forests. Such funds may be used to support a variety of actors as well as activities, depending on the country's needs, including public forest agencies, private actors, community organizations, or a combination of all of these. Forest funds may be coordinated by a national forest or finance ministry or constitute a coordinated spending instrument at the national, regional, or international level.³⁰

While the concept of forest funds is not new, its flexibility as an instrument and ability to leverage multiple sources of financing makes it a promising tool for scaling up finance for forests.

National Forest Funds (NFF) are domestic mechanisms that enable forest country governments to increase and have better control over finance being channeled to domestic forest-supportive activities. Most NFFs draw earmarked income from fees, levies, or taxes, including those that disincentivize unsustainable activities, fund-supported projects or official development assistance (ODA). They may function both as a transfer fund – a platform for distributing funds from different entities to partners on the ground – and a catalytic fund – a source of finance that tackles specific socio-economic obstacles and supports commercial development. The **section 3** case studies present a variety of NFFs: Costa Rica's National Forestry Financing Fund (**Case study 4**), Colombia's Climate Resilience Fund (**Case study 5**), and Indonesia's Reforestation Fund (**Case study 6**).³¹ The examples illustrate the flexibility possible in the design of NFFs, as well as highlight the importance of linking funds to earmarked, reliable, and long-term sources of funding.

Other types of forest funds may be implemented by forest country governments or regional entities but funded and supported by international development organizations, NGOs, and other actors. Examples include the Amazon Fund, CAFI, the recently proposed Tropical Forest Financing Facility, and the conservation funding approach Project Finance for Permanence (PFP).

- **Amazon Fund** is a mechanism developed to tackle deforestation and promote conservation and sustainable forest use in the Brazilian Amazon. The Fund is specifically dedicated to REDD+, a framework developed under the United Nations Framework Convention on Climate Change (UNFCCC) which supports countries' efforts to reduce emissions from deforestation and forest degradation. The Amazon Fund is administered by the Brazilian Development Bank (BNDES) and is funded through donations from a range of country governments, including Brazil, Norway, and Germany.³²
- **Central African Forest Initiative (CAFI)** is a collaborative partnership between six Central African countries, the United Nations Development Programme (UNDP), the UN Food and Agriculture Organization (FAO), the World Bank, and a coalition of international development organizations. It promotes investment and policy reforms at the country level to halt drivers of tropical deforestation.³³

- **Tropical Forest Forever Facility (TFFF)**³⁴ is a forest conservation mechanism proposed by the Brazilian government at COP28, designed to reward countries that have substantially and consistently decreased domestic deforestation and forest degradation.³⁵ It is intended to leverage at least USD 250 billion from sovereign wealth funds and channel it to tropical forest conservation in more than 80 countries. see (Case study 7).
- **Project Finance for Permanence (PFP)** is an approach designed to align efforts on long-term, area-based conservation and facilitate the aggregation of funding from different public and private sources. The PFP approach was conceived in 2011 and has so far facilitated the implementation of conservation projects in several major forest landscapes, including the Brazilian Amazon, Costa Rica, and Canada.³⁶

Barriers addressed

When properly managed and linked to a robust and stable source of revenue, such as fees, fines, or taxes, forest funds can provide a stable source of public finance for forests. This helps to tackle several financing barriers, including high upfront costs and long-term investment needs, while reducing perceived investment risk and attracting additional sources of finance, including from the private sector. Forest funds can be used to decentralize forest management, which can at the same time protect public forest programs from financing risks that may arise through political instability or budget changes and facilitate the delivery of finance to jurisdictional and local-level actors.³⁷

Uptake to date

A 2001 study identified approximately 75 forest funds in existence across 41 countries,³⁸ while a 2014 study identified 70 operational funds with a further 9 under development.³⁹ Several prominent forest funds established by major forest country governments offer a blueprint for future action – see **section 3**.

Forest funds supported by international development organizations have also helped to leverage significant volumes of finance. To date, over USD 730

million has been pledged under the Amazon Fund to projects relating to conservation, the protection of indigenous lands, and the tackling of illegal forest fires. Approximately USD 616 million of this has been disbursed.⁴⁰ Under CAFI, just over USD 890 million has been pledged to date, of which USD 550 million has been disbursed to implementing organizations.⁴¹

Key considerations

- Impactful forest funds require strong policy and political support at the highest levels of government, policies to promote forest tenure security and incentives for active engagement by forest communities, and an investment climate that encourages private-sector investment.⁴²
- During fund design and implementation, the broader enabling environment should be considered to ensure that no adjacent regulation hinders the disbursement of finance from the fund. The impact of a fund is measured in its ability to deliver finance to activities on the ground, not in the volume of finance it accrues through commitments.^b

^b See, for example, the experience of Indonesia's Reforestation Fund, in which large volumes of finance remained unspent due to restrictive spending regulations. See USAID LESTARI (2020) Lessons Learned Technical Brief: Optimization of Reforestation Fund in Central Kalimantan. https://pdf.usaid.gov/pdf_docs/PA00WJ24.pdf.

2.3 Debt reduction instruments

Many countries that host invaluable natural and forest ecosystems under threat are formerly colonized countries that due to past global injustices, now suffer from high levels of debt. These countries tend to also be those most adversely impacted by climate change. Consequently, these governments have limited fiscal space to allocate budgetary spending on conservation and sustainable development. Accessing affordable financing for these activities is also a challenge, due to the perception that they represent high-risk investment environments. Financial instruments such as **debt-for-nature swaps (DNS)** have re-emerged in recent years to achieve the dual goals of biodiversity conservation and debt restructuring.

Countries in the Global South spend a significant proportion of their public revenues to repay their external debt at unsustainable levels⁴³ and are expressing concern over the impact of debt on their ability to build resilience and take ambitious climate action.^{44,45,46} Countries that face debt distress tend to also be those with priority natural and biodiversity conservation areas. A study on 67 countries vulnerable to debt distress found that they are home to over 22 percent of global biodiversity priority areas, a vast majority of which are unprotected. For half of the countries studied, all biodiversity areas could be protected for a fraction of their debt.⁴⁷ The cost of debt is expected to continue increasing in the coming years, which will continue to further divert domestic spending away from critical development priorities, including conserving and protecting critical ecosystems.⁴⁸

With burgeoning debt and limited fiscal space, developing country governments are under even more pressure to exploit their natural assets like intact forests, at the expense of climate, biodiversity, and environmental benefits. Several regional and international initiatives have begun to mobilize multilateral and development institutions to hasten the restructuring and reform of sovereign debt management. Some of the proposals include pausing official debt payments, establishing the G20s Common Framework for Debt treatments to help countries restructure their debt,⁴⁹ and reforming the practices of the International Monetary Fund to increase countries' fiscal space, as spearheaded by the Bridgetown Initiative and the Vulnerable 20 Group.⁵⁰

Efforts to apply these proposals to forest-specific contexts and goals are slowly but surely taking shape. For instance, there are efforts in the Congo Basin to identify and promote financing strategies to help countries in the region achieve the twin goals of development and conservation in critical biodiversity and forest landscapes by WWF, COMIFAC, and Climate Focus.⁵¹ The Congo Basin Forest Partnership (CBFP), through the Fair Deal Task Force,⁵² in collaboration with other regional institutions such as the African Development Bank (AfDB),⁵³ engages governments and grantors to leverage new public and private financing that can unlock new sources of funding for forest-positive activities in the region.

It is still too early to understand the impacts of these proposals as they are yet to be developed and implemented. However, an instrument that has re-emerged in recent years that leverages and reduces debt toward ecosystem protection is **debt-for-nature swaps (DNS)**. DNS are financial

instruments that allow countries to reduce part of their debt in exchange for a commitment to invest in nature-positive activities. DNS usually involves a commitment by a low- or middle-income country to buy back its foreign debt – at a discounted rate – on the condition that it will invest the full amount into nature.

DNS may involve a bilateral deal between official creditors or debt-holding nations, or a tripartite arrangement between a development bank, third-party grantor or investor, and an intermediary such as an NGO.⁵⁴ These two cases are referred to as public and private debt swaps. In a public DNS, the indebted country restructures or buys back debt from the crediting country at a reduced price. Any interest or a share of the price for the buy-back can be channeled to conservation activities (e.g., forest conservation). In a private DNS, an NGO buys back parts of a country's commercial debt from private creditors at a reduced price, and the indebted country repays this debt in full or in part, usually in local currency. The difference between the price of this payment in local currency and the purchase price paid by the NGO for the debt can be invested in conservation measures by channeling it through a fund managed by the NGO.⁵⁵

The **section 3** case studies provide real-world examples of uptake, including a series of DNS between Peru and the U.S. (**Case study 8**), and a sovereign debt strategy implemented in Uruguay (**Case study 9**). The Uruguay case illustrates how different financial instruments can be blended into a debt reduction strategy. The Interamerican Development Bank (IADB) provided a financial guarantee that enabled the transaction, while, in Uruguay, a forest-linked bond provided cheaper credit when goals were achieved, reducing its overall debt in the long run.

Barriers addressed

DNS can be used to support various forest objectives, including restoration, climate mitigation (e.g., nature-based solutions), and forest conservation (e.g., protected areas). Barriers to DNS adoption include high transaction and monitoring costs for projects, a limited number of interested investors and creditors, and problems with long-term debtor commitment.⁵⁶

Uptake to date

DNS have restructured around USD 3 billion in debt since 2015, and single swaps can target debt totaling as much as 1.6 percent of a nation's GDP.⁵⁷ Since the late 1980s, more than 100 DNS have occurred with relatively small size and volume on average.⁵⁸ Looking at the overall scale, however, we can see the marginal impact of DNS on debt service. From 1987-2023, low and middle-income countries treated USD 8.4 billion of their debt through DNS, while they paid more than USD 7.6 trillion in debt services.⁵⁹ Recently, very large swaps have occurred in several countries including Belize (2021)⁶⁰ and Ecuador (2023);⁶¹ though, these have not been developed specifically to support forests but rather for marine conservation. However, DNS has limited effect on the debt relief of countries due to the lack of scale. Although the size of DNS, including for forest conservation, has grown steadily over the years, it remains far too small relative to the immense debt burden countries still face.

Key considerations

- DNS are most suitable in countries that i) have high debt levels and limited public finance or access to alternative financial instruments such as concessional loans⁶² and ii) are rich in biodiversity and natural ecosystems but have limited conservation budget. They must also meet three important conditions, including i) a significant amount of foreign-owned debt, ii) which can be traded at a reduced price and iii) linked to a nature-related conservation activity considered worthy to achieve by the public or private DNS investor.⁶³
- DNS are complex mechanisms that require time and high levels of political will to establish.⁶⁴ DNS often also involve high transaction costs – seen in the cases of Peru (**Case study 8**), Ecuador,⁶⁵ and Belize⁶⁶ – which can in some cases reduce the volume of finance that is ultimately dedicated to conservation activities.
- Efforts to reduce, restructure, or reform a country's debt burden should be implemented in tandem with other instruments such as bonds, guarantees, or concessional finance to maximize the overall impact for countries with high burdens.
- It is also important that nature swaps are implemented with an equity focus and promote nature recovery that is community-led and in alignment with local culture and values. Otherwise, there is a risk that they become another avenue for the Global North to steer nature trajectories in the Global South.

2.4 New market-based mechanisms

New market-based mechanisms are being developed to mobilize financing for forests outside carbon markets. Carbon markets are an important source of financing to protect forests that are immediately under threat, but because the purpose of carbon markets is to mobilize investment in reducing and removing GHG emissions, they have limited utility in protecting forests that are not imminently facing degradation or deforestation or conserving the non-carbon benefits of forests, including biodiversity.⁶⁷ The **High Integrity Forest Investment Initiative (HIFOR)** and **biodiversity credits** are two examples of emerging market-based mechanisms designed to fill this gap.

HIFOR

HIFOR is a mechanism being developed by the Wildlife Conservation Society (WCS) together with technical partners to mobilize finance specifically for the protection of high-integrity tropical forests.⁶⁸

Barriers addressed

In most cases, high-integrity tropical forests cannot access VCM finance because these ecosystems are not under immediate threat of deforestation or degradation, and therefore, protecting them does not avoid GHG emissions. HIFOR helps to fill this finance gap by enabling forest owners and managers, including Indigenous Peoples who manage their territories, to generate and sell HIFOR units. A HIFOR unit embodies the bundle of climate and biodiversity benefits associated with one hectare of well-conserved, high-integrity tropical forest, quantified according to a transparent methodology and verified by a third-party auditor. HIFOR units can be bought by companies, governments, and other entities to demonstrate a quantified contribution to global biodiversity and climate goals. HIFOR represents payment for an environmental services model and purchasing HIFOR units does not support offsetting claims. Projects generating HIFOR units will not be required to have WCS involvement.

A handful of pilot HIFOR projects are currently underway. **Case study 10** presents the ongoing HIFOR pilot in the Republic of Congo.

Uptake to date

HIFOR is still under development.

Biodiversity credits

Biodiversity credits are a financial instrument that promotes the protection and restoration of biodiversity. Biodiversity credits represent net-positive contributions to biodiversity concerning species composition, habitat structure, ecosystem function, and people's use of cultural values associated with biodiversity. Positive contributions are achieved through activities such as preservation or restoration and aim to be measurable, evidence-based, durable, and additional.⁶⁹ Biodiversity credits are promoted in the Kunming-Montreal Global Biodiversity Framework (KM GBF) as one suitable finance tool for leveraging private finance in support of 2030 global biodiversity targets.⁷⁰

Biodiversity offsets, while similar, are distinct from biodiversity credits.⁷¹ Unlike credits, which represent positive contributions to biodiversity, offsets aim to achieve 'no net loss' of biodiversity and are designed to compensate for significant residual biodiversity loss from development projects. Biodiversity offsets are designed to be implemented only after all reasonable steps have been taken to avoid and minimize biodiversity loss at the development site, serving as the last step in the mitigation hierarchy. The "like for like" principle is also key to the concept; that is, the ecosystem to be protected or restored should be as similar as possible to the one lost. **Case study 11** presents one example of a biodiversity offset scheme, Terrasos' habitat banks, which generates biodiversity credits from land conservation in protected areas across Colombia. Habitat banks provide an example of how biodiversity credits can be offered to buyers in aggregated schemes that provide longer-term and more stable payments to landowners.

Barriers addressed

Biodiversity credits attach economic value to protecting and restoring biodiversity. They account for the non-carbon benefits of natural ecosystems, the value of which is not always reflected in other market-based financing mechanisms.

Uptake to date

Biodiversity crediting schemes and markets are still under development and lack common definitions and principles.⁷² There are voluntary and regulated schemes operating at national and international levels. Some schemes make explicit reference to forests, such as the Libreville Plan, which includes an option to buy biodiversity credits as a way to reward High-Forest-Low-Deforestation countries for their contribution to forest conservation.⁷³ Private schemes, such as HIFOR, also recognize that biodiversity credits could be stacked with other units generated from a nature-based project or included in an investment portfolio that aligns with the KM GBF targets.⁷⁴

Key considerations

- While demand for HIFOR units and biodiversity credits may, in the future, be driven by companies seeking to contribute to Beyond Value Chain Mitigation and the KM GBF, they remain nascent, and it is not yet clear how much demand there will be from the private sector.
- HIFOR units and biodiversity credits may benefit from regulations that require companies to make investments in nature or compensate for harm, as in the case of habitat banks in Colombia (see **Case Study 2**).
- Establishing effective monitoring, reporting and verification (MRV) systems as well as protecting the rights of IP and LC has presented challenges for biodiversity crediting frameworks. Effective crediting models should have strong social safeguards which help to not only protect, but enhance, the livelihoods of these communities.

2.5 Indigenous Peoples and local community-led funds

Indigenous Peoples and local community-led funds refer to funding mechanisms created by Indigenous Peoples (IPs), local communities (LCs),^c and/or their representative organizations in response to the extreme finance gap faced by Indigenous Peoples and Local Communities.⁷⁵ These funds prioritize strengthening technical capacities, identifying priorities, and measuring impact in alignment with IPs' and LCs' self-determined needs.⁷⁶ Indigenous Peoples and community-led funds are an alternative mechanism to philanthropic, government, or private finance, all of which are top-down mechanisms with requirements that restrict the ability of IPs and LCs to access funding or use it in alignment with their priorities. Indigenous Peoples and local community-led funds are considered emerging forest financial instruments because the international community is finally responding to the long-term demands of IP and LC organizations to channel finance directly to them.⁷⁷ recognizing well-documented role as the most-effective stewards of vast forest areas.⁷⁸ Financing IPs' and LCs' priorities directly acknowledges these stakeholders as partners, and not beneficiaries, while conserving forests and the carbon, biodiversity, and irreplaceable cultural heritage they contain.

Since 2020, global yearly disbursements of funding that support IPs', LCs', and Afro-descendant peoples' tenure rights and forest guardianship averaged USD 517 million, representing a 36 percent increase over the preceding 4 years.⁷⁹ However, this remains a tiny fraction of all forest, climate, development aid, and philanthropic finance. From 2011-20, approximately USD 270 million per year was disbursed to projects supporting IP and LC forest management, but only 17 percent of these projects involved a participating IP or LC organization.⁸⁰ IPs and LCs received less than one percent of the amount of Official Development Assistance (ODA) directed toward climate adaptation and mitigation in the same years.⁸¹ An analysis of philanthropic grants found that from 2016-20, only 0.6 percent of giving benefited IPs, and only 0.3 percent went directly to Indigenous governments or organizations.⁸² A recent progress report found that only 7 percent of funds delivered so far (USD \$ 1.7 billion) under the COP26 pledge reached IP and LC groups directly.⁸³

Many existing financial instruments are difficult for IPs and LCs to access. This is due to a number of reasons, including: funder perceptions that giving directly to IPs and LCs is high risk; complex rules that hinder fund dispersal; administrative or logistical constraints for IP and LC organizations (e.g., not having access to banking services); the lack of resource access rights; plus insufficient local governance, fund-management structures, and language barriers.^{84,85}

While funders may be recognizing the importance of channeling funding to the local level, many still impose stringent criteria for receiving and reporting on funds. Funders perceive IPs' and LCs' organizations as higher risks due to their perceived lack of existing capacity to navigate international financial systems and expect their organizations to conform to fiduciary requirements that are designed for Global Northern organizations. As a result, funding for forest conservation and restoration tends to be large-scale but goes to intermediary organizations such as consulting firms, international conservation organizations, or multilateral institutions.⁸⁶

Ultimately, these challenges are the result of colonial finance structures that prioritize Global North approaches to funding and development and operate with a fundamental assumption that IPs and LCs are, at best, mere beneficiaries or recipients of funds but not full partners with capacities to manage and determine spending.⁸⁷ Indigenous and community-led funds

^c The use of the terms 'Indigenous Peoples' and 'local communities' in this context does not imply that these two groups have the same rights or recognition under international law. Indigenous Peoples hold unique rights under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), whereas local communities refer to those who do not identify as Indigenous but share a deep connection with and responsibility for the conservation of forest ecosystems over time, such as Afro-descendants, pastoralists, fisherfolk, and others.

offer a decolonial alternative that places IPs and LCs in control of how funding is disbursed, used, and tracked.

Barriers addressed

Indigenous Peoples and community-led funds aim to increase IPs' and LCs' access to and control over finance, prioritizing IPs' and LCs' needs in disbursement and implementation. These funds can be designed to reduce complex application and reporting procedures, address language barriers, and build capacity for financial management — all of which are barriers to IPs, LCs, and their representative organizations accessing finance.

Uptake to date

Indigenous Peoples and local community-led funds include the following:⁸⁸

- **Mesoamerican Territorial Fund (FTM):** established by the Mesoamerican Alliance of People and Forests (AMPB for its acronym in Spanish) to support territorial development and governance in forests across Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, and Panama (**Case study 12**).
- **Nusantara Fund:** established by Aliansi Masyarakat Adat Nusantara (AMAN) and two other community organizations to provide direct funding to IPs and LCs in Indonesia (**Case study 13**).
- **Shandia:** an alliance and political platform set up by the Global Alliance of Territorial Communities (GATC) to establish and strengthen territorial funding instruments led by IP and LCs around the world. It represents 35 million IP and LC people in 24 countries defending over 958 million hectares of forest from Africa, Asia, and Latin America.
- **Indigenous Peoples of Asia Solidarity Fund (IPAS):** a regional-level mechanism established to provide direct funding to IPs in 14 Asian countries.
- **AYNI Indigenous Women's Fund:** established by the International Indigenous Women's Forum to strengthen the capacities and project implementation of Indigenous women's organizations.

- **Podáali Fund:** the first Indigenous-led fund covering the Brazilian Amazon is the result of over 20 years of reflection and collaboration within the Indigenous Movement of the Amazon to create its own mechanism to support Indigenous Peoples' sustainability initiatives. The objective of the Fund is to strengthen the self-determination, agency, cultures, and lifestyles of Indigenous Peoples and promote the autonomous and sustainable management of territories and natural resources, aiming at the good living of Indigenous Peoples and all humanity.

Finance for IPs and LCs comes directly or indirectly from non-governmental organizations (NGOs) including international conservation organizations, and multilateral institutions such as UN agencies, governments, philanthropies, and the private sector. The majority of funding to support IPs' and LCs' rights, leadership, and priorities currently comes from national and local NGOs, which often distribute funds from multilateral and bilateral organizations.⁸⁹ Direct funding to Indigenous and local community-led funds remains small, but these mechanisms are focused on increasing fundraising capacity.⁹⁰ Initiatives such as the Paris Roadmap for Tracking of Funds led by Shandia and Charapa,⁹¹ Path to Scale and the COP26 IPLC Forest Tenure Pledge,⁹² and the Community Land Rights and Conservation Finance Initiative (CLARIFI),⁹³ as well as organizations like The Tenure Facility, are working to increase finance flows directly to IPs and LCs, including through Indigenous and local community-led funds.

International funders have expressed interest in localizing their funding, but data on funding to IPs, LCs, and Afro-descendant Peoples (ADPs) do not show this shift occurring yet. Just 140 projects – 3 percent of the projects that support IPs, LCs, and ADPs – account for more than half of all funding disbursed to these groups.⁹⁴ The lack of evidence for a localization shift in funding modalities underscores the need for IPs and LCs to have their own sources of finance.

Key considerations

- While funding entities may be recognizing the importance of channeling funding to the local level, many still channel their funds via large intermediaries or international organizations that impose complex administrative processes and requirements upon IP, LC organizations, which tends to exclude local and smaller entities that need support most. Funding organizations should prioritize direct access funding for IPs and LCs and projects that are proposed and led by these organizations, over intermediaries.⁹⁵
- Funding entities should also prioritize simplifying their administrative and fiduciary requirements and processes and reduce costs to ensure maximum funding reaches the ground. The Tenure Facility's formula of providing large, long-term grants to IPs and LCs while providing financial assurance and risk management support could be a model to other funders for how to channel finance directly.⁹⁶
- Transparent reporting on funding provided to IP and LC groups is crucial to ensure that financing reaches the intended actors and addresses priority needs. In 2023, the United Nations Permanent Forum on Indigenous Issues (UNPFII) recommended that the Development Assistance Committee of the Organization for Economic Co-operation and Development (OECD-DAC) include a marker to track funding allocated to IPs,⁹⁷ and similar markers could be included by other databases that track public and philanthropic funding. GATC and Charapa are developing a roadmap for enhancing transparency of funding to Indigenous Peoples that includes a framework for labeling funds,⁹⁸ and the Path to Scale Dashboard is a centralized platform tracking funding provided to IPs and LCs.⁹⁹ These initiatives can improve transparency; in addition, by tracking how funding leads to maintaining forest integrity and enhancing community benefits can inform future funding strategies.

3. Instruments in practice

Bonds

- Case study 1. Brazil's Sovereign Sustainable Bond
- Case study 2. Forest Resilience Bond in California's Tahoe National Forest
- Case study 3. The Living Amazon Mechanism

Forest funds

- Case study 4. Costa Rica's National Forestry Financing Fund
- Case study 5. Recycling revenues from Colombia's carbon tax
- Case study 6. Indonesia's Reforestation Fund
- Case study 7. Tropical Forest Forever Facility

Debt reduction instruments

- Case study 8. Series of three bilateral Peru-U.S. DNS (2002 - 2023)
- Case study 9. Uruguay's sustainability-linked bond aligned with sovereign debt strategy (2022)

New market-based mechanisms

- Case study 10. HIFOR Republic of Congo pilot
- Case study 11. Terrasos Habitat Banks

Indigenous Peoples and local community-led funds

- Case study 12. Mesoamerican Territorial Fund
- Case study 13. Nusantara Fund



Case study 1. Brazil's Sovereign Sustainable Bond

What is the instrument?

In 2023 and 2024, to meet ambitious national GHG emissions reduction targets, Brazil issued its two first Sovereign Sustainable Bonds. The bonds allocate resources to finance budget programs and projects that advance forest conservation, support restoration, and combat deforestation, specifically to reduce GHG emissions, increase sustainable land and natural resource management, and preserve terrestrial and aquatic biodiversity. By issuing the bonds, Brazil became the eighth Latin American country to do so, following similar issuances by Chile, Colombia, Uruguay, Ecuador, Guatemala, Mexico, and Peru.

Why was it created?

Brazil's Sovereign Sustainable Bond was developed to help tackle financing challenges relating to domestic GHG reduction, natural resource conservation, social development, and climate resilience. It can also help to reduce perceived investment risk through its rigorous monitoring and reporting mechanisms; by ensuring transparency and accountability, these bonds can encourage greater participation from the private sector.

How does it work?

The Sovereign Sustainable Bond is a debt instrument that raises funds to finance budgetary programs, expenditures, and projects with environmental and social benefits.

Approximately half of the generated funds go to environmental initiatives while the other half are allocated to social programs. The bond was developed according to Brazil's Framework for Sustainable Sovereign Bonds, which aligns with international best practices and defines nine categories of eligible projects and programs with environmental benefits and five with social benefits, along with exclusion criteria.

Eligible expenses are tied to Brazil's national legislation like the Annual Budget Law and Multiannual Plan. Interest and principal of sustainable bonds are overseen by Brazil's National Treasury to ensure that investors assume no risk associated with any portfolio expenses. The bonds were intended to diversify the country's private investor base by attracting international actors. The bonds were issued with a maturity of 7 years and an interest rate of 6.5 percent.¹⁰⁰

A Sovereign Sustainable Finance Committee composed of representatives from different government agencies is responsible for resource allocation, oversight, planning, implementation, and monitoring, as well as tracking emissions related to the bonds.

How much funding has been mobilized to date?

In November 2023, the inaugural issuance raised USD 2 billion by extending debt maturity, accessing new investors, and supporting Brazil's debt management strategy. In June 2024, Brazil's second issuance raised an additional USD 2 billion, with 77 percent of non-resident investors.

Because the bonds have only recently been released, it is too early to conclude the impacts and lessons learned.

Case study 2. Forest Resilience Bond in California's Tahoe National Forest

What is the instrument?

In 2018, a public-private partnership Forest Resilience Bond (FRB) was formed by the non-profit Blue Forest, the U.S. Forest Service (USFS), the World Resources Institute, and the National Forest Foundation (NFF). Its objective was to help direct private capital toward USFS-guided forest restoration and watershed activities in the Tahoe National Forest that generate environmental and social benefits.

Why was it created?

Due to a long history of wildfire suppression and commercial logging, California's forest is unnaturally dense and homogenous, increasing wildfire risk and degrading water resources. Under drought conditions and with a warming climate, wildfires in the state have grown larger, more frequent, and increasingly destructive. Fourteen of California's twenty largest wildfires on record have occurred since 2008,¹⁰¹ and from 2017-21, losses from wildfire were estimated at more than USD 117 billion on average annually.¹⁰² To mitigate these risks, more than 2.5 million hectares of forest lands in California require restoration treatments,¹⁰³ but immediate funding is limited and has been slow to disperse.

How does it work?

Blue Forest administers the bond, serving as the investment developer and sponsor. Investors – including pension funds, impact investors, insurance companies, or foundations – provide concessional and commercial loans to FSB Yuba Project LLC, a subsidiary and special purpose vehicle (SPV) that is fully owned by Blue Forest. From this subsidiary, investors receive fixed returns on investment of 4 percent for commercial lenders and 1 percent for concessional lenders. In addition, the state, philanthropic foundations, and federal forest agencies bolster funding to the subsidiary with grants and in-kind contributions. The subsidiary disperses loans to the implementation partner, NFF, to conduct the restoration, fuel treatment, and regeneration activities for the local partners, who make contracted annual payments to the subsidiary. The FRB directly benefits government agencies, private landowners, utilities, companies, and other stakeholders, providing disaster risk reduction, water quality enhancement, wildlife habitat, and forest restoration.¹⁰⁴

How much funding has been mobilized to date?

In its first phase, the FRB raised USD 4 million in capital from 4 investors. The second phase, launched in 2021 and now underway, has secured USD 25 million in capital to finance fire treatment activities.¹⁰⁵

How is funding being used?

In its first phase, the FRB restored and protected 1,083 hectares and 3,247 hectares of ecosystems, respectively, protected 34 million cubic meters of source water supply, and sustained 72 jobs. The second phase targets 11,331 hectares and aims to protect about 19,425 hectares of forest. Blue Forest has also conducted or planned similar projects across the Western United States.

What lessons have been learned?

The program has encountered several challenges. A complex contracting process – with requirements from government agencies, investors, and foundations over 18 months – slowed the first project, but subsequent projects moved more quickly once structures were established.¹⁰⁶ For shares and payments, Blue Forest first tried using a pay-for-performance model, linking the repayment frequency and amount to environmental outcomes, but it proved too complex. Instead, fixed repayments were calculated according to the economic value of environmental outcomes, reducing risk and lowering capital costs for investors.¹⁰⁷ Investor repayment of the FRB is tied to certain milestones, such as federal and state funding that is reimbursable upon project completion. In this sense, the FRB is not a financial bond but rather a fixed repayment lending structure.

These challenges offer useful lessons for other bond implementers. The possibility of a slow start-up phase should be planned and accounted for in the bond design, as should flexibility for implementing alternative payment structures. As this case study shows, considering costs and risks to investors should be central to the design of payment structures.

Case study 3. The Living Amazon Mechanism

What is the instrument?

The Living Amazon Mechanism is a blended financial instrument designed to enhance socio-bioeconomic value chains and support income generation among IP and LC in the Amazon. Its objective is to prevent the conversion of native forests from harmful economic activities by strengthening the value chains of non-timber forest products (NTFPs), which are usually collected in native forests rather than harvested in monocultures.

Why was it created?

The Brazilian Amazon holds huge potential for the development of a sustainable bioeconomy, hosting a huge variety of tropical commodities which includes açai, Brazil nut, pepper, and cacao. Yet, current value chains lack productive capacity, infrastructure, and financing. They also often lose out to more profitable activities such as cattle farming and monocultures. The objective of the instrument is to provide concessional finance to IP and LC cooperatives and associations, which helps to incentivize sustainable production and build stronger value chains for NTFPs.

How does it work?

Natura, an international cosmetics company that sources bio-ingredients from Brazilian forests for its products, serves as the instruments' anchor investor and off-taker. Natura is an alumnus of the Global Innovation Lab for Climate Finance.¹⁰⁸ The instrument was originally conceptualized as a debt mechanism composed of two parts: a Receivables Fund and an Enabling Conditions Facility. The Receivables Fund provides direct credit lines to cooperatives and associations. Its capital structure includes a subordinated tranche (first-loss risk absorption) and a senior tranche, with off-takers and concessional investors participating in the subordinated tranche. The Enabling Conditions Facility (ECF) aims to enhance suppliers' capabilities to deliver quality products and increase productivity through technical, financial, and productive support. It is managed by the Brazilian Fund for Biodiversity (FUNBIO). The ECF focuses on strengthening forest communities, cooperatives, and associations to meet market demands and ensure sustainable livelihoods.

In its initial phase, rather than being based on the receivables fund, it used a Brazilian type of bond called CRA – Agribusiness Receivables Certificate, which is a debt mechanism issued from a securitization company backed on

receivables from the agricultural sector. This is a very well-known financial instrument in the Brazilian capital market, commonly used as an alternative to traditional bank credit lines. The CRAs, however, are not exclusively for green or sustainable finance and can be used for either traditional or transactions with sustainable aspects.

In the specific case of the Living Amazon Mechanism, the receivables were based on IPLCs cooperatives sales of NTFPs, having Natura as a major off-taker. The presence of an off-taker having long-term agreements with these cooperatives helps the development of the value chain, provides clarity to suppliers, and mitigates repayment risks to investors. The Living Amazon Mechanism allows access to capital markets and companies to take on a role traditionally held by financial institutions while creating more opportunities to bring additional value to suppliers. Even though it has sustainable aspects, this transaction was not labeled as a green/sustainable bond under any public or private taxonomy.

How much funding has been mobilized to date?

In its initial stage, the project mobilized approximately BRL 12 million (USD 2.5 million) from private and philanthropic capital¹⁰⁹ and recently secured funds from the Global Environmental Facility (GEF)¹¹⁰ to leverage private capital. This CRA, backed by receivables from 10 local cooperatives, allocated 80 percent of proceeds to operational costs and 20 percent to long-term capital expenditures.

What lessons have been learned?

Translating the complexity of capital markets to local cooperatives was a significant challenge that the instrument helped address as a first step. Achieving full commercial viability while decreasing reliance on non-commercial capital remains a significant challenge, but Natura's role as an anchor investor and off-taker has been crucial to attracting other stakeholders for engaging into the structure and offers a useful example for other private companies seeking to engage in similar sustainable financing initiatives.

Because the mechanism has only recently been implemented, it is too early to draw conclusions about impacts.

Case study 4. Costa Rica's National Forestry Financing Fund

What is the instrument?

Although international funding has always been an important addition to Costa Rica's budget for nature, the country has historically covered the costs of conserving its forests using its resources.¹¹¹ The most important instrument in this regard has been the National Forestry Financing Fund (FONAFIFO). FONAFIFO has been credited for decreasing the country's deforestation rate, which was once among the highest in the world, and increasing tree cover.¹¹² FONAFIFO is based on the "simple but proven principle" that the state pays landowners to protect the forest on their land with the money coming mainly from fuel taxes.¹¹³

Why was it created?

During most of the 20th century, Costa Rica focused on agriculture for its economic development and enacted laws that encouraged the conversion of forest ecosystems into agricultural land. As a result, the country lost half of its mature forest from 1940-80.¹¹⁴ Starting in the late 1970s, the Costa Rican government became increasingly alarmed about the high rate of deforestation and its negative effects. To combat deforestation, the government adopted various forestry laws from 1979-96 which included financial incentives such as tax deductibles and forest bond certificates for reforestation activities. FONAFIFO was created under the Forestry Law of 1996 to consolidate existing financial instruments for forests into a single system and channel money to forest conservation and restoration more effectively and efficiently.¹¹⁵

How does it work?

Among FONAFIFO's main funding pillars is Costa Rica's national tax on fossil fuels. The 3.5 percent tax has been collected since 1997 and generates an annual revenue of USD 26.5 million.¹¹⁶ The fund channels this revenue to small and medium-sized producers who engage in forest plantation and reforestation, the establishment of forest nurseries and agroforestry systems, the rehabilitation of degraded areas, and the provision of environmental services from forests, forest plantations, or other activities. Direct beneficiaries include companies, individuals, and communities. Access to funding is conditional upon transparent funding requests and registration processes.¹¹⁷ The government prioritizes areas with high levels of poverty and assists smallholders and Indigenous communities in submitting requests for funds.

Forty percent of beneficiaries are communities living below the poverty line.¹¹⁸ Since 2021 Costa Rica has expanded its payment for ecosystem services (PES) with funds from the GCF REDD-plus results-based payments (RBPs) pilot programme.¹¹⁹

How much funding has been mobilized to date?

From 1997-2018, a total of USD 500 million was provided to around 19,000 farmers and landowners who committed to undertake rainforest protection and restoration activities on their property.¹²⁰

How is funding being used?

From 1997-2018, FONAFIFO paid landowners across 1.2 million hectares (23.5 percent of Costa Rica's national area) for protecting 1 million hectares of mature forests and reforesting 71,000 hectares. Beneficiaries also include people living across 162,000 hectares of Indigenous lands such as the Cabécar and Bribri territories.¹²¹ With resources from RBPs, FONAFIFO paid landowners to protect forests in over 652,600 hectares (12% in Indigenous territories) benefiting 32,00 Indigenous individuals (42% women), and 20,00 non-Indigenous Peoples (20% women).¹²² These achievements were independently verified by an external evaluator.

What lessons have been learned?

Transparency and accountability have been crucial for FONAFIFO's success and its continued popularity. For example, all strategic and operational plans, budgets, financial statements, and other information are available online.¹²³ In recent years, however, the fund has faced challenges in the wake of the Covid-19 pandemic. Public health restrictions on vehicle use led to lower fuel consumption and lower income from the national fossil fuel tax resulting in a budgetary gap of approximately USD 1.5 million in 2020.¹²⁴ To bridge this gap, the Costa Rican government was able to access REDD+ results-based payments from the GCF. As of September 2024, over USD 40 million has been transferred from the GCF to strengthen Costa Rica's Payment for Environmental Services program, which includes contracts in Indigenous territories.¹²⁵ A key takeaway from this is the importance of taking a landscape approach to forest financing, which allows for parallel efforts and financing streams to be aggregated when necessary. The program was also strengthened through evidence-based recommendations from the independent verification.

Case study 5. Recycling revenues from Colombia's carbon tax

What is the instrument?

Colombia has several public funding instruments that facilitate the flow of finance to forests, one of which is the national carbon tax. The revenue from the carbon tax flows into various environmental funds, including the Sustainability and Climate Resilience Fund (FONSUREC), the Peace Fund, and Herencia Colombia, a PFP initiative.¹²⁶

Why was it created?

Colombia's carbon tax seeks to help achieve the country's national commitments to reduce greenhouse gas emissions. The tax was adopted in 2016 as part of a sweeping fiscal reform to raise money for Colombia's peace process.¹²⁷ FONSUREC was created in 2022 to provide the public sector with large-scale funding for climate investments.¹²⁸ The Peace Fund was established in 2016 to finance Colombia's national peace process. Some of its funds are earmarked for environmental peacebuilding such as a program for the substitution of illicitly used crops.¹²⁹

How does it work?

Since 2017, companies must pay a tax of USD 5 per tCO₂eq when selling, producing, and importing gasoline, kerosene, jet fuel, diesel fuel, and fuel oil. The level of taxation depends on the volume of fuel and the greenhouse gas intensity of the respective fuel. Coal will be taxed beginning in 2025.¹³⁰

Since 2023, 80 percent of the revenue from the carbon tax has been allocated to FONSUREC, which uses the funds to reduce and monitor deforestation, conserve water resources, and protect, conserve, restore, and sustainably use strategic areas and ecosystems. The remaining 20 percent of the tax revenue is transferred to the Peace Fund, which was set up to finance Colombia's national peace process.¹³¹ Approximately 25 percent of the Peace Fund is earmarked for various environmental causes, including the reduction and monitoring of deforestation, and 5 percent is earmarked for strengthening the national system of protected areas. The ecosystems that the fund aims to protect as a priority include riparian forests, tropical montane cloud forests, tropical humid forests, and Andean forests.¹³²

Colombia's carbon tax is also connected to a non-taxation carbon neutrality mechanism. Instead of paying the tax, companies subject to the tax have the option to purchase certified emission reduction credits from projects

for the conservation and restoration of ecosystems in Colombia that meet internationally recognized certification standards. This mechanism helps to finance nature-based climate mitigation measures, particularly in the forestry sector.¹³³

How much funding has been mobilized to date?

From 2017-22, the carbon tax had already generated at least USD 350 million, exceeding the Ministry of Environment's previous budget. No information has been made available on the quantity of finance channeled to FONSUREC or the Peace Fund to date.

How is funding being used?

So far, there is little evidence of the impact of Colombia's carbon tax on its forests. However, the allocation system, which clearly defines where the tax revenue should go, facilitates the efficient use of tax revenue for forest conservation.¹³⁴ The impact of the scheme and the lessons it provides for the implementers of similar initiatives will depend on the level of carbon pricing and the ability of the scheme to efficiently allocate resources to impactful activities, mobilize private investment, and create a pipeline of investable projects.¹³⁵

Case study 6. Indonesia's Reforestation Fund

What is the instrument?

Dana Bagi Hasil-Dana Reboisasi, DBH-DR is a national program dedicated to supporting reforestation and forest rehabilitation in Indonesia.

Why was it created?

The history of the country's Reforestation Fund (Dana Reboisasi, DR) is firmly rooted in the politics of commercial logging under Suharto's New Order regime from 1966-98. In the 1980s, the Suharto government took a series of steps to concentrate control over timber rents in Indonesia's forestry sector. The government introduced the volume-based levy on timber production, which later became the Dana Reboisasi (DR). The DR was set up as an extra-budgetary resource for the Ministry of Forestry to finance reforestation and forest rehabilitation.¹³⁶ In 2004, following regulatory changes that saw the transfer of authority over forestry affairs from the regency government to provincial governments, the fund was changed from a special allocation fund (Dana Alokasi Khusus, DAK) to a revenue sharing fund (Dana Bagi Hasil, DBH), which distributes revenues between the central, provincial, and district governments.

How does it work?

The DBH-DR is financed through a volume-based levy on timber which concessionaires must pay for harvesting timber in natural forests.¹³⁷ Funds are earmarked for reforestation, rehabilitation of forests and degraded land, and supporting activities such as forest fire prevention and control, research and development, and capacity-building for local communities.¹³⁸

Forty percent of DBH-DR funds are distributed among provincial and district governments for financing reforestation and rehabilitation activities in producer regions. Sixty percent of funds are administered by the national government for reforestation and rehabilitation outside of producing areas as well as for supporting activities.

How much funding has been mobilized to date?

From 1989-2013, the DR had an aggregated revenue of USD 5.8 billion, making it the largest source of government revenue from the commercial forestry sector in Indonesia.¹³⁹

How is funding being used?

The exact impact of the DBH-DR on Indonesia's forests has not been quantified. According to Indonesia's Enhanced Nationally Determined Contribution (NDC) submitted in 2022, approximately USD 144 million from the DR has been used since 2019 to finance the implementation of Indonesia's NDC.¹⁴⁰

What lessons have been learned?

During the Suharto era, the fund's effectiveness was low due to poor financial management and revenue administration, corruption, and fraud. For example, the ministry disbursed USD 600 million to finance politically favored projects outside the DAK-DR's mandate of promoting reforestation and forest rehabilitation.

Since 1998, successive post-Suharto governments have taken steps to improve transparency and accountability of fund administration by transferring authority over the DR to the Ministry of Finance. At the same time, however, the rules for how the DBH DR funds can be used and the processes for doing so have been so restrictive that the majority of financing (over 70 percent) remained unused in the regional treasury until 2019. Reasons for this included a government regulation that stipulated that DR funds could only be used for Forest and Land Rehabilitation (RHL), even though the country has limited land suitable for rehabilitation. Since 2017, the government has made a concerted effort to optimize the use of the DBH-DR by broadening the scope of activities for which the funds may be used. The new regulation now includes a range of activities related to forest and land rehabilitation, social forestry, forest security, and forest protection.^{141,142}

The example of Indonesia's Reforestation Fund illustrates how important it is that country governments consider not only the financing but also the functioning of forest funds during their design. Funds should be embedded in a policy environment where regulation not only enables but facilitates, the flow of earmarked funds to priority forest activities. Such an environment can help to ensure that finance is not only committed but also reaches activities on the ground.

Case study 7. Tropical Forest Forever Facility

What is the instrument?

The Tropical Forest Forever Facility (TFFF) is a global forest conservation payment mechanism proposed by the Brazilian government at COP28.¹⁴³ The instrument would provide explicit, direct, and straightforward payments to governments in 80 tropical countries that are working to protect and restore forests.

Why was it created?

The TFFF is proposed as a multilateral investment fund intended to incentivize tropical forest nations to slow and reverse deforestation and forest degradation. The vision for this facility emerged at the heels of the Amazon Fund's creation, which is to create a mechanism that, unlike REDD+, is not based on demonstrating large-scale emissions reductions in exchange for payments. Instead, the focus is on the scale of land to be conserved. The rationale for such a proposal is to mobilize large-scale conservation and restoration of tropical forests. Despite the many pledges, sufficient funding has not been mobilized, and where it is made available, access to finance can be complex.¹⁴⁴ These have been challenges faced by forest countries in the context of REDD+.^{145, 146} Furthermore, intact forests not facing imminent threats are not eligible for REDD+ financing, due to a lack of additionality arguments. By providing an explicit value per hectare conserved or restored, the TFFF would help correct market failures that do not account for the value of ecological services provided by forest ecosystems.

The mechanism is still under development, intending to initially raise up to USD 250 billion from public and private sources for disbursement to tropical forest countries taking action to tackle deforestation. Annual payment to countries is based on preserved forest cover. There will be no requirement for developing baselines, reference levels, or calculation of emissions levels, but countries will be required to have a transparent and robust way of measuring native forest cover. All hectares of tropical vegetation would have the same value, set tentatively at USD 30 per hectare. If a country commits to preserve 1 million hectares, it will receive USD 30 million. However, if it deforests 1 hectare, actors will forfeit a payment equivalent to 100 times the value of the hectare. This would create a large disincentive for participating actors to deforest.¹⁴⁷

How does it work?

Sources of financing for the facility are under discussion. In the medium to long term, the contributors to the fund could include sovereign wealth funds and multilateral funds, such as a World Bank investment fund, and profits from investments would go toward paying for conservation. In the shorter term, sectoral pledges from economic industries such as agriculture and oil, among others can contribute financially to protect the world's forests, beyond their own decarbonization.

The TFFF is designed to rely on existing finance mechanisms and avoid increasing funding demands on government budgets. The financial structure is based on the provision of low-cost deposits over a long-term investment strategy:

- **Sponsor countries** make long-term (20+ years), low-interest deposits in the TFFF or provide guarantees which enable it to issue low-cost bonds.
- **TFFF reinvests capital** in a diversified, fixed-income, and equity investment portfolio that generates a higher financial return. The surplus finance accrues to the account of tropical forest countries.
- **Monitoring and verification** using satellites helps to determine forest cover in participating countries.
- **TFFF proceeds** are allocated based on performance and the size of qualifying forests.

The TFFF would not involve direct expenditure or grants by sovereign sponsors but rather the provision of a loan or deposit that will be repaid. Participating tropical forest countries receive investment returns if they show evidence of successful forest conservation and restoration. The current proposal states that to be eligible to receive returns forest countries would be required to keep the deforestation rate below 0.5 percent, and allocation will be reduced by the equivalent of 100 hectares for each 1 hectare deforested or degraded.

Forest countries' initial shares in TFFF's returns would be based on their respective proportions of the total area of qualifying forest covered by TFFF. Participating countries that successfully meet the forest conservation

threshold would have the choice to receive periodic cash payments or keep their returns invested in the TFFF portfolio to grow with interest over time. The TFFF is intended to grow to a value of USD 100 to 125 billion, with participating forest countries likely to expect a share of between 3.5 to 4 percent of this total value.

What are the next steps?

The World Bank is currently acting as a strategic partner to the Government of Brazil in the development of the proposal, and a designated Working Group will continue with the design, validation, and consultation phases throughout 2024. A number of key characteristics are still to be defined; for instance, the proposal suggests that forest country governments would initially receive USD 30 per hectare of forest protection, but it remains to be seen whether this amount will be sufficient to cover needs and incentivize action.

Case study 8. Series of three bilateral Peru-U.S. DNS (2002 - 2023)

What is the instrument?

In 2023, the governments of Peru and the United States, in partnership with four international environmental groups, finalized a bilateral DNS and forest conservation agreement to protect the Peruvian Amazon. It was the third in a series of bilateral DNS agreements – the first two in 2002 and 2008 generated roughly USD 36 million for conservation – between the two countries.¹⁴⁸ Under the 2023 agreement, activities are planned to take place in 3 highly biodiverse priority areas of the Amazon that collectively cover about 10 percent of the country.¹⁴⁹

How does it work?

Over 13 years, the most recent DNS agreement will reduce Peru's debt burden by USD 20 million to fund efforts to conserve protected areas, advance natural resource management, and develop sustainable livelihoods for forest-dwelling communities.¹⁵⁰ Under the agreement, the Government of Peru will redirect its debt payments into a conservation fund that provides grants for conservation, restoration, management, and sustainable use activities. The Peruvian Trust Fund for National Parks and Protected Areas (Profonanpe) administers the grants, and the international environmental groups donated an additional 3 million USD to the 2023 DNS.

How much funding has been mobilized to date?

In total, the 3 DNS agreements have helped to mobilize approximately USD 56 million for conservation activities in Peru from 2002-36.¹⁵¹

How is funding being used?

In 2002 and 2008, the DNS agreements established a framework for implementation and made strides in achieving its forest conservation goals. A five-member oversight committee – including representatives from each government and participating environmental group – was established to oversee DNS terms and review grant applications from local NGOs.¹⁵² Projects were implemented by local NGOs, including local partners of the four international environmental groups. In 2008, the DNS funded a wide range of activities, including community resource management (28 percent), guard post construction to reduce illegal logging (21 percent), inspections of forest concessions (12 percent), technical assistance for forest concessionaires (10 percent), environmental education (8 percent), establishment of municipal

conservation areas (8 percent), biological monitoring (5 percent), and logistical support for protected area management (4 percent).¹⁵³

What lessons have been learned?

As the third DNS is now underway, lessons can be drawn from the outcomes of the initial two. In 2008, some projects lacked a long-term monitoring plan or formal evaluation, underscoring the need for better tools to evaluate projects. In some cases, decision-making involvement from so many partners (e.g., local partners and international NGOs) reduced overall accountability and slowed administrative activity. Importantly, short funding cycles of projects, coupled with limited engagement with the oversight committee, limited capacity building within Peru's nonprofit sector, while local capacity gains that did occur were not always well communicated to funders. Other concerns were raised about the longevity of interventions after short-term grants run out (e.g., whether the use of guard posts to monitor illegal timber would cease). Moreover, short project timelines impaired partners' ability to establish projects, build community relationships, reach conservation goals, and demonstrate impact.¹⁵⁴

Case study 9. Uruguay's sustainability-linked bond aligned with sovereign debt strategy (2022)

What is the instrument?

In 2022, the government of Uruguay issued USD 1.5 billion in sustainability-linked bonds (SLBs) under the Sovereign Sustainability-Linked Bond (SSLB) framework, which was jointly prepared by the ministries of Economy and Finance; Environment; Livestock, Agriculture, and Fisheries; Industry, Energy and Mining; and Foreign Affairs, with the technical assistance of the Inter-American Development Bank (IDB) and the United Nations Development Programme (UNDP).¹⁵⁵ The SLB allows Uruguay to align its financing strategy with its climate and environment targets.

How does it work?

The SLB under the SSLB Framework is linked to two key performance indicators (KPIs). The first KPI focuses on the evolution of the intensity of greenhouse gas (GHG) emissions, while the second KPI is linked to the protection and maintenance of native forest areas. Both KPI targets are based on the quantitative goals set for 2025 in Uruguay's Nationally Determined Contributions (NDC), i.e., to cut the aggregate gross GHG emissions intensity by half and maintain a 100 percent native forest coverage.¹⁵⁶ The innovative financing mechanism allows the government to link interest rate payments to the achievement of the KPIs. In other words, investors can reward the country by lowering their borrowing costs if Uruguay meets its ambitious targets. In turn, they can also raise the interest rate if the government fails to meet the targets, and thus, create an innovative financing mechanism that incentivizes sustainable policymaking.¹⁵⁷ This issuance is the first time the IDB has backed a sustainability-linked sovereign bond.¹⁵⁸ The bond will reach maturity in 2034.

How much funding has been mobilized to date?

The government initially planned to issue bonds worth USD 1.5 billion, but total demand far exceeded this, reaching USD 3.96 billion. The issuance attracted 188 investors from Europe, Asia, the United States, and Latin America, 21 percent of which are now holders of Uruguay's debt.¹⁵⁹

How is funding being used?

In its latest annual report from May 2024, Uruguay reported achieving a 46 percent reduction in the intensity of aggregate GHG emissions per real GDP unit, compared to 1990 levels. This means Uruguay is 4 percent short of the 2025 target of reducing its GHG emissions intensity by 50 percent.¹⁶⁰ On the other hand, Uruguay achieved its second KPI of reaching 100 percent

preservation of native forest area, with an actual increase of 11,832 hectares (1.4 percent), compared to 2016.¹⁶¹ The government has stated plans to continue promoting sustainable policies and investments in the energy, transport, and forest sectors to support the achievement of its KPIs and ultimately lower the interest rates of its borrowers.

What lessons have been learned?

The sovereign sustainability-linked loan in Uruguay is the first of its kind for the country and demonstrates how the combination of different tools, including a sovereign bond, a guarantee of an MDB, and a step-up/step-down financing mechanism, can help countries not only with their sovereign debt strategy but also with their climate and environmental goals. They also show that the market recognizes Uruguay's commitment to meet its ambitious targets in terms of greenhouse gas intensity and forest conservation as set out in its NDC. However, it is still too early to draw long-term lessons.

Case study 10. HIFOR Republic of Congo pilot

What is the instrument?

HIFOR is being piloted at several sites, including Nouabalé-Ndoki National Park, which covers over 400,000 hectares in the far north of the Republic of Congo. Established in 1993, the Park is one of the most ecologically intact areas remaining in the Congo Basin and supports exceptionally healthy populations of hunting-sensitive species such as forest elephants, western lowland gorillas, and chimpanzees. Its climate value is also very high, having removed an estimated 11 million tons of CO₂ from the atmosphere over the past decade.

Why was it created?

The Nouabalé-Ndoki Foundation, a public-private partnership that manages the park, receives significant conservation finance, but current commitments remain insufficient to cover all operational and sustainable development goals and are not secure in the long term.

How does it work?

In late 2023, WCS signed an agreement to work with the Foundation,¹⁶² the government of the Republic of Congo, and local community representatives to develop a HIFOR pilot at the Park. Finance from HIFOR sales will enable existing management systems (including improved law enforcement, systematic monitoring, ecotourism, and a community development program) to be expanded and sustained over the long term. In addition to the environmental benefits, this will bring enhanced benefits to Indigenous People and other residents in the only two settlements close to the Park, which are already actively involved in many aspects of Park management. The HIFOR methodology requires extensive and sustained participation of these groups in the design and implementation of the project, including Free Prior and Informed Consent. Per the methodology, the project will run for a minimum of 30 years. Benefit-sharing frameworks will be developed through a consultative process over the coming year.

Because the pilot project is still undergoing implementation, it is too early to draw conclusions about impacts and lessons learned.

Case study 11. Terrasos Habitat Banks

What is the instrument?

Habitat banks are areas of land where actions for the preservation and restoration of ecosystems and sustainable land use are implemented to offset negative impacts on biodiversity.¹⁶³ Habitat banks offer biodiversity credits that can be bought by individuals or businesses wishing to offset negative biodiversity impacts caused by their activities, or simply seeking to contribute to biodiversity conservation. Terrasos, an environmental investment company, designed and implemented the first habitat bank in Colombia and has to date implemented habitat banks in eight regions across the country.¹⁶⁴

Why was it created?

Colombia is one of the world's most biodiverse countries but has seen rapid ecosystem depletion in recent decades, largely driven by land use change for major development projects. The majority of funding for biodiversity comes from the public sector, which spent approximately USD 535 million on biodiversity per year from 2010-2020. Despite this spending, a large funding gap remains.¹⁶⁵ A 2018 analysis identified financing needs of USD 22 million per year from 2017-30 to meet Colombia's National Biodiversity Strategy and Action Plan (NBSAP).¹⁶⁶ A 2021 analysis identified a 32 percent funding deficit if the goals of the NBSAP are to be met, amounting to USD 1.6 billion.¹⁶⁷ This total does not reflect any forthcoming updates to Colombia's NBSAP that may be made following the adoption of the KM GBF.

Colombia has a well-established market for biodiversity offsets, which generates a level of regulatory demand for credits. Planned development projects such as mining, oil, and gas infrastructure are legally required to offset residual biodiversity impacts by restoring or protecting an equivalent habitat elsewhere, according to a 'no net loss' policy. However, the market for land-based credits has a reputation for involving high transaction costs and offering short-term projects with poor transparency around impacts.¹⁶⁸ The market has also come under criticism for various issues including the issuance of poor-quality credits¹⁶⁹ and the violation of the rights of IPs and LCs.¹⁷⁰ Habitat banks were proposed as a solution to current market shortcomings.

How does it work?

Habitat banks represent a new type of environmental conservation mechanism and a departure from traditional, project-based crediting. They aggregate compensations, or outcomes, of biodiversity conservation or

restoration. Each hectare of a habitat bank conserved or restored generates one biodiversity credit. The credits are then sold to project developers of infrastructure, mining, oil, and gas projects with required investments in conservation.

Habitat banks are run through an independently managed trust fund.¹⁷¹ They operate under a results-based payment scheme through which revenue generated from the sale of biodiversity credits ensures the management and maintenance of the habitat bank. Returns are provided to investors in the scheme once credits are sold. Credits have a set starting price, determined by calculating the net current value of all direct, indirect, and opportunity costs (e.g., labor, capital) over a 30-year project lifetime.¹⁷² Final prices are determined through agreements between the habitat bank developer and offsetting parties. Prices are not influenced by any broader regulation or market dynamics.

Terrasos works with private landowners – mostly farmers – in the development of habitat banks. Landowners can provide their land for the generation of credits, in exchange for annual payments, or they can be involved in the operation of the project, which can yield additional payments if the project is profitable.¹⁷³ For landowners seeking to generate carbon or biodiversity credits from their land, habitat banks are an attractive alternative to single project-based crediting. Habitat bank contracts protect land for 30 years, which promises a longer and more stable revenue stream than those associated with conventional offset project models. Compared to project-based offsets, habitat banks also involve lower transaction costs which can make them a more cost-effective alternative for landowners.¹⁷⁴

How much funding has been mobilized to date?

By the end of 2022, Terrasos had sold approximately USD 1.5 billion worth of credits.¹⁷⁵ In mid-2024, a US-based environmental trading platform announced the listing of 10,000 new Terrasos credits.¹⁷⁶

How is funding being used?

Habitat banks have so far been developed in 8 locations in Colombia, covering a total of 2,676 hectares of land. Terrasos has set a target of generating direct benefits for biodiversity and indirect social benefits for landholders over 10,000 hectares of land by 2030.

What lessons have been learned?

One key lesson learned during the development of Terrasos' habitat bank initiative was the discovery that embedding an activity into law can considerably enhance investor interest. During the conception stage, habitat banking was not explicitly recognized as a viable investment opportunity in Colombia's regulation surrounding the use of environmental offsets for compliance purposes. Discussions between Terrasos and the country's Environment Minister led to the inclusion of habitat banking in this regulation, which ultimately helped to raise the profile of habitat banks as a green investment opportunity and increase private sector interest in Terrasos' initiative. Such experiences help to illustrate the importance of ensuring the implementation environment of forest and conservation financing initiatives is conducive to private investment.

Case study 12. Mesoamerican Territorial Fund

What is the instrument?

The Mesoamerican Territorial Fund (Fondo Territorial Mesoamericano, FTM) is an IP and LC-led, coalition-based financial instrument for advancing territorial development and governance in forests across Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, and Panama.

Why was it created?

In Mesoamerica, territorial rights have been recognized across 65 percent of forested areas,¹⁷⁷ and as such, autonomous IPs and LCs have a high potential to shape the future of forests. However, IPs and LCs living in forested areas often face significant challenges related to insecure tenure rights, socioeconomic marginalization, forcible eviction, discrimination, and violence.¹⁷⁸

How does it work?

Activities financed by FTM include strategic initiatives defined by communities that have the potential for replicability, scalability, and public policy development. FTM finances activities across four key areas – climate change mitigation and adaptation, sustainable natural resource management and biodiversity conservation, IP and LC rights and governance, and sustainable community initiatives – with cross-cutting goals related to gender, youth, and social inclusion.

How much funding has been mobilized to date?

So far, FTM has been funded by the Ford Foundation, the Climate and Land Use Alliance, and USAID. The fund deploys direct, rapid finance, ranging from small grants (between USD 10,000 to 50,000) to large grants (starting at USD 51,000), as well as agile, responsive grants for emergencies.¹⁷⁹ FTM aims to increase funding from 30 to 40 donations of USD 50,000 or more annually.¹⁸⁰ The pilot phase during 2020-21 was reported to have a turnover of USD 600,000, 80 percent of which was direct grant financing to member organizations, and 20 percent was administration and technical support to grantees.¹⁸¹

How is funding being used?

By 2022, MTF had supported 10 projects with IP organizations, LC organizations, and mixed IP and LC organizations across its 6 countries. Projects supported nearly 17,000 people in 228 communities, with some

USD 600,000 invested by 2022. Some 80 percent of the total funds were invested directly into territories with 20 percent dedicated to administration, operations, and accompaniment costs. Numerous entrepreneurship ventures were supported by FTM, including initiatives related to food self-sufficiency (25), community forestry (8), alternative tourism (6), and value-added timber products (4). The organization aims to increase direct funding and expand to other geographical areas by 2028.¹⁸²

So far, little information has been made available on the development and implementation of the Fund.

Case study 13. Nusantara Fund

What is the instrument?

The Nusantara Fund is a unique funding instrument developed by and for IPs and LCs in Indonesia. It was established in 2023 by the 3 largest organizations supporting Indigenous People in Indonesia: Alliance of Indigenous Peoples of the Archipelago (AMAN) -- the national representative body of Indonesia's Indigenous population, Agrarian Reform Consortium (KPA), and Friends of the Earth Indonesia (WALHI).

Why was it created?

Before the establishment of the Nusantara Fund, AMAN, KPA, and WALHI each operated independently, directing funding instruments to support different IP and LC groups in Indonesia. The funds merge into a single body to accelerate change, increase the delivery of finance to local-level actors, and make a greater contribution to reducing global emissions.¹⁸³

The objectives of the fund include increased mapping of Indigenous territories; protection and recognition of 28 million hectares of land; rehabilitation and restoration of a further 35 million hectares of land; realization of sustainable models of production, distribution, and consumption; and the establishment of "Peoples' Education" centers to increase the knowledge and capacity for managing lands, territories, and resources.¹⁸⁴

How does it work?

The Fund provides direct financial support to IP and LCs in Indonesia for their efforts to prevent damage and protect and improve the environment, land, forests, and resources. The Fund provides grants of up to approximately USD 64,000.¹⁸⁵ No information is available on the total volume of finance disbursed under the Fund to date.

How much funding has been mobilized to date?

The Nusantara Fund was launched with over USD 3 million from a group of philanthropies, including the AVAAZ Foundation, Ford Foundation, and Tenure Facility, as well as Norway's International Climate and Forest Initiative (NICFI) and International Fund for Agricultural Development (IFAD). It is ultimately intended to attract USD 20 million in investments.¹⁸⁶

How is funding being used?

The Nusantara Fund is intended to directly impact at least 62 million people, equivalent to 25 percent of Indonesia's total population, and 62 million hectares of forest and land, equivalent to one-third of the country's total land area.

So far, little information has been made available on the development and implementation of the Fund.

4. Outlook: Maximizing the impact of forest finance



To achieve forest goals, economies that rely on the extraction and consumption of natural resources must be replaced by a fiscal and regulatory environment that mandates and incentivizes the protection, restoration, and the equitable and just management of forests and ecosystems. First and foremost, the vast quantities of gray finance that have potential negative impacts on forests must be shifted while significantly more and new finance needs to be invested in forests.¹⁸⁷

The emerging financial instruments presented in this brief have the potential to contribute to these objectives and offer new opportunities to:

- Account for the economic value of intact forests
- Incentivize private sector investment into activities that restore and maintain healthy forests
- Deliver finance to high-impact activities, such as the protection and sustainable management of high-integrity forests
- Enable the most effective forest guardians – Indigenous Peoples and local communities (IP and LCs) – to independently determine how to fund and manage their forest ecosystems
- Meet the triple objective of sustainable development, conservation, and restoration of biodiversity and carbon sinks
- Disincentivize activities that act as drivers of deforestation or other unsustainable activities

No instrument or approach covered by this brief should be considered a silver bullet; achieving the 2030 forest goals requires an all-hands-on-deck approach. While the uptake of these instruments could be scaled further, new and emerging financing instruments should be linked to economic, policy, and regulatory levers to support governments and businesses in their

effort to transform business-as-usual practices into feasible sustainable business models. Actors in the Global North must take responsibility for historical harms and provide lasting support to communities that allows the development of stable, equitable, and prosperous livelihoods in forest regions. This requires deeper collaboration and coordination between public and private funders at both the global and local levels and for financial instruments to be tailored to landscape scales and approaches.^d

The Forest Declaration Assessment Partners propose several principles for how forest financial instruments – such as those explored in this brief – can be implemented to satisfy these objectives. The ideas supporting the principles are meant to link broader policy, legal, and regulatory interventions with forest financing instruments. They hopefully catalyze discourse between stakeholders such as policymakers, finance institutions, multilateral development organizations, and companies that want to help protect and restore forests globally.

^d Landscape approaches refer to initiatives operating within a socio-ecological system that consists of natural and/or human modified ecosystems that can address the drivers of deforestation across the landscape and help achieve a broader set of objectives for different stakeholders.

Achieving the 2030 forest goals: Principles for forest financing



1. Align fiscal policies and incentives with forest and sustainable development goals.

For new financial instruments to have a transformative impact, existing regulatory, fiscal, and policy incentives need to shift business-as-usual practices and enable conservation, restoration, and sustainable development. Forest country governments should consider multiple (non-exhaustive) prongs and interventions toward this end.

a. Review and shift harmful subsidies. Governments must align fiscal and financial policies with NDCs and forest goals and accelerate efforts to green and shift existing gray finance. Governments should review policies and investments across all sectors to identify potential negative impacts on forests and shift harmful subsidies toward conservation-based development and green-economy initiatives. Revenue generated from shifting harmful subsidies could be used to finance initiatives that safeguard natural ecosystems and support local smallholder farmers should be supported in sustainable and conservation-based practices. Repurposing subsidies can be a powerful way to implement Target 18 of the Global Biodiversity Framework^e and Article 2.1(c) of the Paris Agreement.

b. Penalize harmful practices while rewarding sustainable ones.

Forest country governments should consider establishing financing instruments to incentivize production practices that conserve forests

while discouraging harmful activities. While environmental-linked fiscal policies that address externalities caused by fuel combustion are on the rise, governments have yet to fully leverage these tools for addressing the drivers of deforestation and forest degradation.¹⁸⁸ A tax on drivers of deforestation and unsustainable production practices, e.g., unsustainable livestock production, monoculture plantations, etc. would go a long way to disincentivize harmful behaviors. Alongside this, a preferential tax rate can be given to producers that have fulfilled sustainable production criteria through third-party certification.¹⁸⁹ For example, the government of Gabon requires all forest concessions to be certified under Forest Stewardship Council (FSC) certification. Those that do not comply will be faced with a tax hike, while FSC-certified companies will enjoy a tax rebate.¹⁹⁰

In addition, opportunities to increase fees and fines for forest clearing and other illegal forest activities should be strongly considered. Forest sector-related taxes and fees are often not updated, and in many cases, remain lower than market rates.¹⁹¹ The additional revenue stream generated could be earmarked and channeled to domestic or national forest funds that prioritize conservation and development.

c. Incentivize subnational or provincial actors to act. To incentivize regional-level actors, ecological fiscal transfers (EFTs)^f could be implemented. This can not only serve as an incentive but also unlock more funding for local actors conducting critical activities such as enforcement. For instance, in Brazil, revenues are transferred to local governments based on the percentage and quality of local land designated as protected areas, while in India, states receive revenues based on the proportion of forest cover in the region.¹⁹²

^e Target 18 of the Global Biodiversity Framework calls on actors to “Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least 500 billion United States dollars per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.” Available at <https://www.cbd.int/gbf/targets/18>

^f Ecological fiscal transfers are a mechanism which distribute federal or regional-level public resources to local governments based on environmental indicators.



2. Ramp up forest financing from industrialized to developing countries that is accessible, affordable, and long-term.

Most Global South countries face challenges in initiating the bold reforms needed to reconcile their development pathways with forest goals. Incentives currently offered by industrialized countries, for example in the context of REDD+, are neither commensurate with this challenge nor with their responsibility for driving resource exploitation in a global economy.¹⁹³ Industrialized nations have benefited from resource exploitation and offshoring their footprint in forest-rich territories.

The Global North bears a historical responsibility to increase flows to nature and forest-rich countries; it is crucial that industrialized countries fully deliver on existing pledges, avoid double counting of their financing and vastly scale up funding. In addition, industrialized countries should:

a. Strengthen trust between financing entities and actors in forest countries. Forest country governments should be viewed as equal partners, instead of the asymmetrical “donor” vs “recipient” relationship. Financial support should be adjusted to meet domestic public policy priorities and contexts and funders should find ways to address complex disbursement rules and processes that currently restrict funding from reaching the intended actors. For example, the average disbursement rate of overseas development assistance for REDD+ funding in DRC from 2010-21 is estimated at 71 percent (i.e., 29 percent of committed funds were not disbursed) compared to a global average of 98 percent.¹⁹⁴ Simplifying funding processes to reach forest country governments and other local actors in reasonable time frames and removing bottlenecks causing delays can go a long way. In addition, funds flowing through international intermediaries should be evaluated based on the success of these intermediaries in training, empowering, and eventually handing over fiduciary responsibilities and roles to domestic entities, enabling

more funding to be channeled via local financial institutions in the future.

b. Consider in earnest and fully support proposals from forest government countries. Proposals such as the Tropical Forests Forever Facility (TFFF) point to the frustration and urgency felt by forest country governments with existing mechanisms as well as the need for new ways of deploying international finance for forests. As discussed previously, the premise of the TFFF emerges from years of insufficient and slow disbursement of public finance, through results-based payment mechanisms such as REDD+. As the clock ticks down to 2030, industrial country governments should follow the leadership of forest country governments and support their efforts in good faith. The TFFF is still in its early stages, and crucially, it remains to be seen how the Facility will mobilize the much-needed large-scale financing to channel to forest countries. Industrialized countries should commit to investing in the facility (e.g., through a portion of a sovereign wealth fund or development banks) to build momentum, which can encourage forest country governments to participate.

c. Leverage multiple instruments or interventions in tandem for maximum impact. Alongside aid and grants, industrial country governments should consider financial and non-financial interventions, e.g., regulatory, policy, and legal levers. Financing entities should consider assessing where their government – through other programs or initiatives – or domestic companies are financing activities or sectors causing forest loss or degradation in the forest country. Engaging and closely coordinating between these actors and linking to other demand-side levers is crucial.



3. Attract new and additional private finance by lowering risks of conservation with blended finance instruments.

Blended financial instruments, such as bonds, guarantees, and concessional finance, can help to reduce risk for private sector investors and unlock new financing for forest conservation and restoration. However, the uptake of blended financing in the forest context has lagged; these instruments are often directed toward lower-risk projects with a solid business case (e.g., energy) or large-scale infrastructure projects with adverse land use impacts.⁹

Existing blended and concessional mechanisms need to be reformed by targeting forest-specific goals, which will enable countries to attract private financing toward conservation, biodiversity, and sustainable development.¹⁹⁵ Upfront funding, complemented by stable and affordable long-term financing can help tip the scale of incentives stacked against forest conservation and restoration. For example, the Forest Investment Program's concessional finance has helped address funding gaps in countries seeking to implement policies and measures from national REDD+ planning but are unable to access results-based payments.¹⁹⁶ In the Congo Basin, a partnership between the Central African Forest Initiative (CAFI) and &Green will enable &Green to make derisked loans backed by a funding entity.¹⁹⁷ This is part of a larger push in the forest-rich region to mobilize more private investment.

In addition, policymakers should develop sustainable finance taxonomies that signal to businesses, banks, and investors that conservation, restoration, and sustainable ecosystem management are the next frontier of investments.

⁹ For example, the Multilateral Investment Guarantee Agency (MIGA) promotes investments in developing countries through guarantees to lenders and investors. However, all 52 projects financed by MIGA in the Congo Basin, home to the largest area of remaining intact tropical forests in the world, are in the infrastructure, energy and mining sectors. There are no investments in the forestry sector. Available at: https://wwfint.awsassets.panda.org/downloads/wwf-congo-basins-forests_discussion-paper-2023_eng_nov_2023.pdf



4. Prioritize building capacities and channeling funds to mechanisms that are directly funding local actors, especially IPs and LCs.

Indigenous Peoples' and local community-led funds reframe the narrative of IPs and LCs as beneficiaries or recipients of finance to partners and leaders in defending their rights, conserving forests, and addressing climate change.¹⁹⁸ Following the leadership of IPs and LCs fundamentally challenges established financial infrastructure and expectations which are based on Global North and colonial assumptions about how money should be used and distributed. Supporting Indigenous Peoples and community-led funds will require funding agencies, financial institutions, and philanthropies to think differently about the purpose of finance and forest or climate goals – for example, to center their support on Indigenous and local communities' self-determination, which includes the ability to own, use, and manage their lands, territories, and resources.¹⁹⁹

IP and LCs continue to call for increased direct access funding to ensure that resources are directed to the strengthening and safeguarding of communities' self-determination.^{200, 201} Some elements of direct access include moving away from funder-centric and -defined areas of support; IPs and LCs should have direct negotiation and discussion with financial partner countries or funders to determine the level of funding, parameters, and agreements on the funding mechanisms. Funders should minimize the use of intermediaries to channel funds and complex institutional layering that results in funding becoming prohibitive or reduce resources reaching the ground. Forest funds, such as those mentioned in this paper, should have the full engagement of IPs and LCs from the outset and establish equitable benefit sharing mechanisms.

Where intermediaries are necessary, they should be the choice of the Indigenous Peoples' organizations. Intermediaries should undergo a thorough vetting process and have funding modalities and systems that are fit for IPs and LCs, and grounded in Free, Prior and Informed Consent (FPIC) best practices. This means funding should be rightsholder-led, mutually

accountable, flexible, long-term, gender inclusive, timely, and accessible.²⁰² For instance, simplifying application and administrative processes, and relaxing or adapting fiduciary requirements can go a long way in enabling grassroots groups' access to much-needed finance.²⁰³ Building and strengthening the capacities of IPOs (Indigenous Peoples Organisations) and local community organizations to be able to take on the financial and fiduciary responsibilities and distribute funding effectively to grassroots organizations should be a priority for international public and philanthropic finance.



5. Reform sovereign debt to create fiscal space for conservation.

While DNS have re-emerged in recent years to generate new financing for forest protection, swaps do not make a dent in a country's overall sovereign debt. Forest country governments need support in enlarging their fiscal space to be able to spend on protecting natural ecosystems, biodiversity, and sustainable development. Beyond swaps, debt forgiveness for conservation and green development can significantly open up fiscal space for forest country governments. This can also help decrease mounting pressures on governments to destroy natural forest areas for economic growth through mining, agriculture, and large infrastructure projects.

As previously discussed, creative approaches are being proposed by various actors, which include pausing debt repayments, reforming the practices of the IMF to better support countries' debt management, and utilizing special drawing rights (SDRs) for climate purposes. Forest country governments, financing entities, and development banks should consider how these proposed reforms could be informed and linked to forest protection, restoration, and management goals. Such efforts would be transformative for forest country governments with multiple positive spillover effects beyond forest conservation and protection.



6. Link financial instruments to emerging measures to reduce the import of deforestation-linked commodities.

An increasing number of consumer countries are implementing demand-side interventions to restrict the import of products linked to forest loss and degradation. Most recent measures have emerged from the EU, with the EU Deforestation Regulation (EUDR) and the Corporate Sustainability Due Diligence Directive (CSDDD), but other major consumer countries such as the U.S., UK, and China have also developed demand-related policies. Importer countries and development institutions should link financial instruments to new trade regulations to incentivize and enable businesses and local public agencies to improve forest-linked supply chains. Without sufficient capital, upfront financing, or affordable credit lines, businesses – in particular small-scale domestic actors – are unlikely to meet these requirements and end harmful activities in forest landscapes.²⁰⁴ For instance, the EU could consider establishing a fund that offers companies and smallholders operating in forest-risk commodity production regions concessional loans or grants that support them to meet EU Deforestation Regulation (EUDR) requirements.

Blended finance mechanisms such as forest bonds should also be used to help mobilize new finance for sustainable commodity production. For instance, large producer companies with strong commitments to reduce and end deforestation in their supply chains could sell corporate deforestation-free forest bonds to raise funds that help improve their supplier traceability mechanisms, engage and provide additional capacity building to local actors, and facilitate their compliance with EUDR. Such bonds could help incentivize companies to work on improving their supply chains, rather than exiting in response to high compliance requirements. They could also be an ambitious investment product for investors who see a strong and profitable future for deforestation-free supply chains.

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ABOUT

The Forest Declaration Assessment is a collaborative process carried out by civil society organizations and researchers, known as the Forest Declaration Assessment Partners. Previously the NYDF Progress Assessment, the Forest Declaration Assessment has since 2015 published annual updates on progress toward global forest goals. All assessment findings undergo a rigorous peer review process conducted by experts across the globe. To learn more about the Forest Declaration Assessment, please visit www.forestdeclaration.org/about/assessment.

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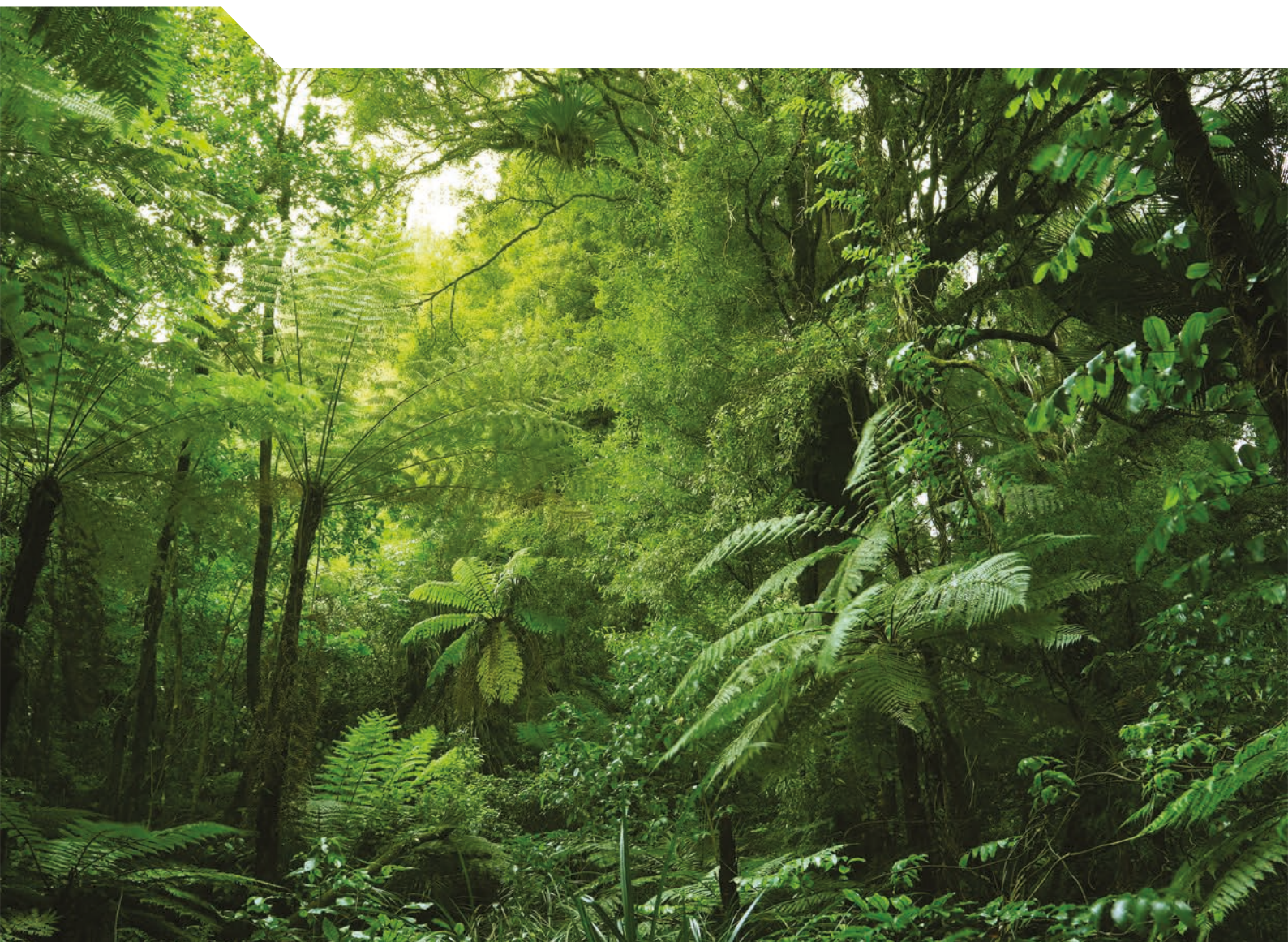
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OECD-FAO Business Handbook on Deforestation and Due Diligence in Agricultural Supply Chains



OECD



**Food and Agriculture
Organization of the
United Nations**

**OECD-FAO Business
Handbook on Deforestation
and Due Diligence
in Agricultural Supply Chains**

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Foreword

This *OECD-FAO Business Handbook on Deforestation and Due Diligence in Agricultural Supply Chains* (Handbook) aims to help companies embed considerations on deforestation and forest degradation in corporate due diligence procedures. It is based on the risk-based due diligence framework set out in the *OECD-FAO Guidance for Responsible Agricultural Supply Chains* (OECD-FAO Guidance) and the *OECD Due Diligence Guidance for Responsible Business Conduct*.

This Handbook forms part of the OECD and FAO's work associated with the OECD-FAO Guidance for Responsible Agricultural Supply Chains (OECD-FAO Guidance) (OECD-FAO, 2016^[1]) and [Responsible Business Conduct \(RBC\) in Agriculture](#).

The sourcing and trade of many agricultural commodities involves a complex network of business relationships, including producers, farmers, traders, suppliers and other actors that are part of global agrifood supply chains. As global demand for food grows, challenges can arise which may result in adverse impacts related to agricultural expansion, including into forests and other natural ecosystems. As a result, business decisions made by companies sourcing, processing and selling agricultural commodities and products can cause, contribute to or be directly linked to deforestation or forest degradation.

For almost 15 years, companies and stakeholders in the timber sector have widely applied due diligence approaches in response to regulations (e.g. the European Union Timber Regulation and the United States of America Lacey Act (Lacey, 2008^[2]) aimed at ensuring the legal origin of timber. To facilitate due diligence and reduce risks, timber exporting countries have developed verification or assurance systems to prove and document the legality, sustainability and traceability of wood products. In parallel, the UN and the OECD have developed recommendations and guidelines on how companies can integrate risk-based due diligence in their business decisions and business relationships to identify and address supply chain risks which have an impact on people and the planet. These efforts have resulted in work on reducing environmental and social risks among agrifood enterprises, in co-operation with stakeholders from farmer organisations, civil society and enterprises themselves. However, many enterprises still struggle to understand how the risks of deforestation and forest degradation can manifest in their supply chains and how they as enterprises can take practical measures to identify, prevent and address these risks through risk-based due diligence.

This Handbook aims to help business address deforestation and forest degradation risks in global agricultural supply chains through risk-based due diligence, including by integrating existing business efforts to trace timber legality, where relevant. The Handbook is designed for agrifood enterprises that source or use commodities and products that may be associated with deforestation or forest degradation. While impacts on forests occur upstream in the supply chain, companies downstream often drive the demand for these commodities, which in turn increases deforestation risks. This Handbook has thus been designed for use by enterprises along the entire supply chain, from production to retail.

As part of the development of this Handbook, the OECD and FAO convened a Multi-Stakeholder Expert Working Group (MSWG) comprised of stakeholders from business, government, civil society, academia and others to support the drafting of this Handbook, including elements and types of information that would be useful to help companies operationalise risk-based due diligence to address deforestation. In addition to feedback from the MSWG, an informal public consultation was organised from June to July 2022.

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The OECD and FAO would like to thank all stakeholders who contributed to the development of this Handbook, ranging from enterprises, academia, civil society organisations and certification bodies to numerous governments from around the world. Particular thanks go to independent expert Duncan Brack who led the drafting process of this Handbook in co-operation with the OECD and FAO and the Multi-Stakeholder Working Group (MSWG).

At the OECD Centre for Responsible Business Conduct (OECD RBC Centre), the Handbook was drafted and supervised by Shivani Kannabhiran, Sophia Gnych and Sebastian Weber. The OECD would like to further thank the Working Parties on Responsible Business Conduct (WPRBC) and Agricultural Policies and Markets (APM) for contributing inputs and comments to this Handbook.

At the Food and Agriculture Organization of the United Nations (FAO), the Handbook was drafted by Tomislav Ivančić, Caroline Merle and Kristin DeValue, under the supervision of Pascal Liu, Tiina Vähänen and Serena Fortuna. Special acknowledgment goes to Astrid Agostini, as well as to colleagues in FAO's Forestry and Markets and Trade Divisions, and offices around the world who provided technical support to this Handbook.

This handbook is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Franziska Rau, Advisor at the Initiative for Sustainable Agricultural Supply Chains (INA), GIZ, provided valuable input to the Handbook on behalf of the INA deforestation team.

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Executive summary

The OECD-FAO Guidance for Responsible Agricultural Supply Chains (OECD-FAO Guidance) helps enterprises in the agricultural sector observe existing international standards for responsible business conduct in agricultural supply chains. The OECD-FAO Guidance is an example of the growing recognition of how risk-based due diligence can help enterprises identify and respond to risks in their operations and global supply chains. In addition to due diligence actions taken by enterprises, several governments have adopted or plan to introduce, mandatory obligations of due diligence in global supply chains, including to address deforestation concerns.

Business decisions made by companies sourcing, processing and selling agricultural commodities or food products may have an impact on forests, which can include deforestation. As a salient risk related to sourcing, deforestation can also have larger impacts on ecosystems and the people depending on them. However, many enterprises struggle to understand how risks of deforestation and forest degradation can manifest in their supply chains, including on practical measures they can take to identify, prevent and address these risks through risk-based due diligence.

This Handbook was developed by OECD and FAO to help companies embed considerations on deforestation and forest degradation into their responsible sourcing and corporate due diligence efforts. It is informed by FAO's extensive work and experience on halting deforestation and forest degradation and promoting responsible governance of tenure. The handbook builds on the leading international, government-backed standards on supply chain due diligence and responsible business conduct: the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct and the associated due diligence framework introduced in the OECD-FAO Guidance for Responsible Agricultural Supply Chains and the OECD Due Diligence Guidance for Responsible Business Conduct. This Handbook demonstrates how the OECD-FAO Guidance can be applied to address deforestation by contextualising existing recommendations and helping users understand how to proactively introduce due diligence and reduce the potential risk of deforestation taking place in their supply chains.

Introduction

This chapter introduces the Handbook, outlines who it has been developed for and provides key definitions.

This *OECD-FAO Business Handbook on Deforestation and Due Diligence in Agricultural Supply Chains* (Handbook) aims to help companies embed considerations on deforestation and forest degradation in corporate due diligence procedures. It builds on the risk-based due diligence framework set out in the OECD-FAO Guidance and the OECD Due Diligence Guidance for Responsible Business Conduct.

The Handbook provides background information, resources and practical actions that enterprises can take when implementing each of the steps of risk-based due diligence in line with the OECD-FAO Guidance. It draws on current corporate practice, including existing tools and resources, data and metrics that are available to support enterprises when they consider how best to identify and avoid deforestation and forest degradation.

Key definitions

Deforestation: The FAO defines deforestation as the conversion of forest to other land use independently whether human-induced or not (FAO, 2020^[3]).

Forest degradation: There is no FAO or other standard definition for forest degradation; the FAO encourages countries to define it themselves. The definition included in the Accountability Framework proposed by a group of international NGOs, which applies to other natural ecosystems as well as forests, is: “Changes within a natural ecosystem that significantly and negatively affect its species composition, structure, and/or function and reduce the ecosystem’s capacity to supply products, support biodiversity, and/or deliver ecosystem services” (Accountability Framework, 2020^[4]).

For a full list of definitions, see the Glossary.

Who is this Handbook for?

The Handbook is designed for enterprises in agrifood supply chains which source or use commodities and products that may be associated with deforestation or forest degradation. While the Handbook is primarily concerned with the impacts of land use, planting and harvesting on forests, it can be used by enterprises along the entire supply chain, from production to retail.

Increasingly, companies are introducing risk-based due diligence approaches in their policies and procedures to help guide their responsible sourcing efforts and promote responsible business conduct. Many small- and medium-sized enterprises (SMEs) struggle to address trade and market requirements linked to responsible business conduct, including deforestation. To help smaller enterprises address deforestation, each chapter of this Handbook features a box with suggestions on how SMEs can introduce risk-based due diligence in line with the OECD-FAO Guidance.

The Handbook can also be a resource for financial institutions as they assess and evaluate potential business partners’ policies and activities relevant to due diligence expectations and potential deforestation. Annex A of the Handbook lists resources related to deforestation.

Forests, natural ecosystems and conversion

The due diligence framework described in this Handbook applies both to deforestation and forest degradation. For ease of reading, the term 'deforestation' is here used to apply to both.

Forests are not the only natural ecosystem that may be adversely affected by conversion to agricultural production. Savannah, grasslands, peatlands and wetlands, among others, can also be at risk when considering land use. Many due diligence policies adopted by enterprises now cover the conversion of these ecosystems alongside forests, and incorporate references to, for example, the protection of high conservation value and high carbon stock areas. While this Handbook focuses only on forests, the due diligence steps it describes are generally also applicable to the conversion of other natural ecosystems.

A full list of definitions used in this Handbook is included in the Glossary.

Forests and deforestation

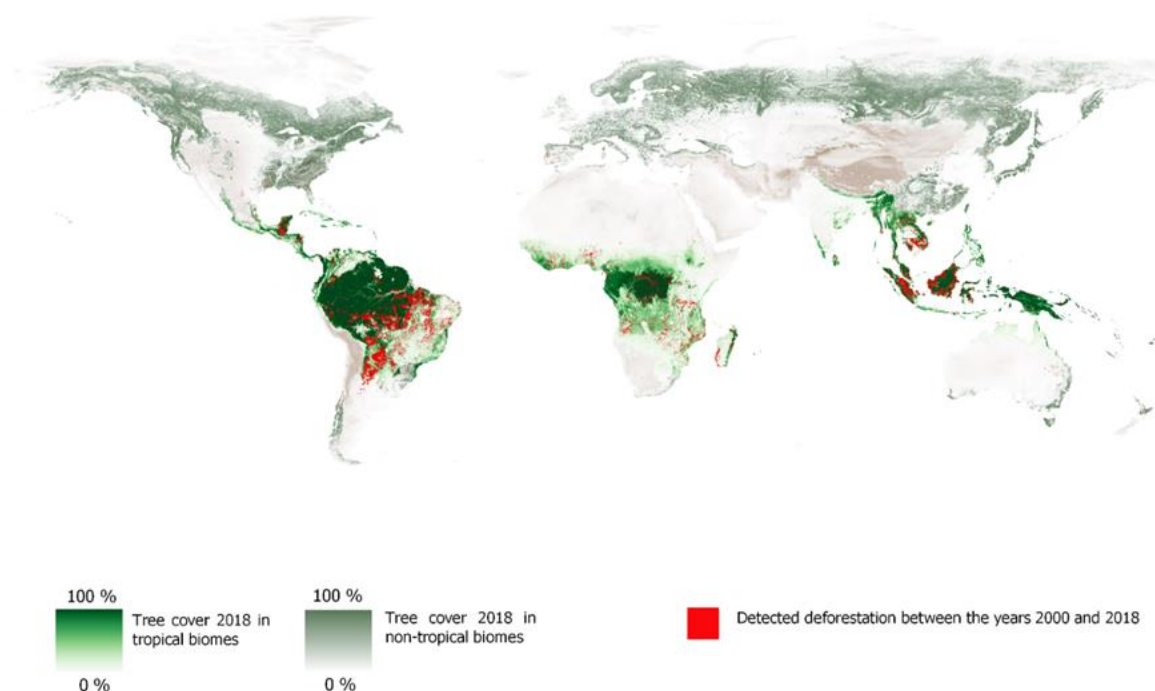
This chapter introduces deforestation and forest degradation in the context of global supply chains. It presents the magnitude of the problem and its origins in commodity production and sourcing, along with the development challenges that can contribute to deforestation in different contexts.

Healthy forests are vital to the three pillars of sustainable development: economic, social and environmental. Continued business growth and jobs in the agricultural sector, and global food security, depend on forests. Forest ecosystems are the largest terrestrial carbon sink, critical to meeting climate goals; they also regulate rainfall and water cycles and help to maintain stable local environments, which are essential to supporting livelihoods and sustainable agricultural production. Approximately 1.6 billion people depend on forests for their livelihood, including about 70 million Indigenous Peoples. Forests contain more than 60 000 different tree species and provide habitats for a large majority of animal species. (FAO, 2020^[3]; FAO and UNEP, 2020^[5]).

In 2020, 31% of the world's land area – 4 billion hectares – was covered by forest. Since 1990 an estimated 420 million hectares of forests have been lost through deforestation (FAO, 2020^[3]). From 2015 to 2020, the rate of deforestation was estimated at 10 million hectares per year, though afforestation and reforestation has supported forest recovery in some parts of the world (FAO, 2020^[3]). Loss of forests, particularly natural forest, was especially high in the tropics over this period (see Figure 1).

Forest degradation is a result of unsustainable logging operations, wood fuel extraction, shifting agriculture, grazing or fires and affects forest ecosystems in tropical, temperate and boreal biomes alike. In all these cases the forest retains the capacity to regrow, but these activities typically reduce forest cover faster than it naturally recovers and affect the diversity of species hosted in those forests (FAO and UNEP, 2020^[5]). While forest degradation is difficult to measure, studies suggest that it accounts for about one-third of the overall impact of tree cover loss, measured in terms of carbon emissions (Federici, 2015^[6]).

Figure 1. Deforestation, 2000-2018



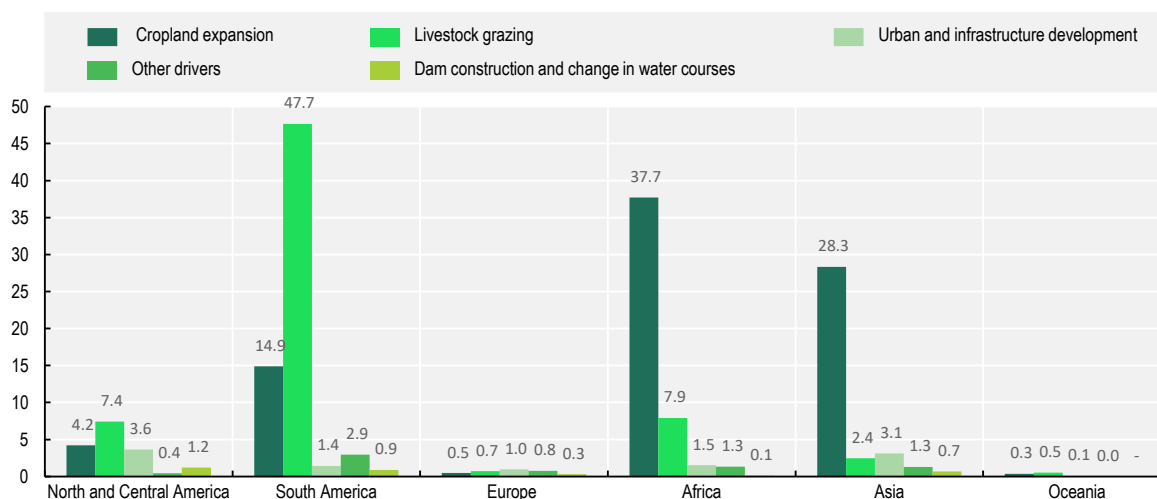
Source: FAO (2022^[7]), FRA 2020 Remote Sensing Survey, <https://www.fao.org/forest-resources-assessment/remote-sensing/fra-2020-remote-sensing-survey/en/>

Impacts of agricultural production on forests

Agricultural production can both drive deforestation and be negatively impacted by deforestation. FAO's global Remote Sensing Survey of forest resources estimates that from 2000-18 nearly 90% of global deforestation was a result of agricultural expansion, including 52% from cropland expansion and 38% from livestock grazing (FAO, 2021^[8]). Figure 2 illustrates the main drivers of deforestation by region. Similarly, deforestation, coupled with climate change, can also greatly impact agricultural production, which can in turn have significant impacts on food availability and demand.¹

Figure 2. Main deforestation drivers across the world's regions

Drivers of deforestation by region, 2000-18 (in Mha)



Source: FAO (2022^[7]), FRA 2020 Remote Sensing Survey, <https://www.fao.org/forest-resources-assessment/remote-sensing/fra-2020-remote-sensing-survey/en/>

A range of factors underpin the link between deforestation and agricultural production (Geist, 2002^[9]). While growth and development have raised millions out of poverty, they have also increased demand for food and led to changes in lifestyles and diets as people consume lower volumes of staple foods and more meat, dairy products, fruit and vegetables, and processed foods. These trends are projected to continue (OECD-FAO, 2021^[10]) as the global population is anticipated to reach 9.7 billion people by 2050 (UN, 2019^[11]). Taking dietary changes and other factors into account, this implies a growth in food demand of 35-56% (Van Dijk, 2021^[12]), potentially increasing demand for land and pressure on forests.

The liberalisation of trade and business has encouraged the growth of global supply chains; an estimated one-third of agri-food exports are now traded within global value chains (FAO, 2022^[13]). While the act of deforestation takes place at specific locations upstream in the supply chain, downstream firms and suppliers play a critical role in ensuring that the risk of deforestation is addressed within the commodity supply chains from which they source.

It should be noted that a significant proportion of the clearance of forests for agriculture has been illegal. A comprehensive survey published in 2021 estimated that 69% of the conversion of tropical forests for agriculture that had taken place between 2013 and 2019 had been conducted in violation of national laws and regulations (Forest Trends, 2021^[14]). Illegal logging (for timber) remains a serious concern in many countries, with an estimated value in international trade at between USD 50-150 billion a year (World Bank, 2019^[15]).

Agricultural commodities and deforestation

Based on studies of the drivers discussed above, deforestation linked to agriculture has often been associated with a select group of commodities (Pendrell, 2019^[16]). However, business, demand and trade can oscillate over time. Neither supply nor demand is fixed, and growth in demand for new agricultural products can drive deforestation in other contexts, including in temperate climates.

International attention is commonly given to the impacts on forests of certain commodities which have seen increased production and export over recent decades, often dependent on expanding land for agricultural use by reducing forest cover. Commodities cultivated or grown in an area after it is deforested are considered as “direct drivers” of deforestation. It is the manner in which these commodities are produced, not the commodities themselves, however, that links them to deforestation.

A small group of commodities have received wider attention because recently deforested lands are often used for their production. These include beef, dairy products and leather from cattle, soybeans, palm oil, cocoa, coffee, wood and rubber. Consequently, public and private responses and multi-stakeholder initiatives have tended to adopt commodity-specific approaches in their efforts towards more sustainable production models, respecting forests. Examples include the Amazon Soy Moratorium signed in 2006 where 90% of companies in the Brazilian soy market committed to avoiding the purchase of soy grown on recently deforested areas in the Brazilian Amazon. Likewise, the governments of Côte d'Ivoire and Ghana and 35 leading cocoa and chocolate companies have joined together in the Forest and Cocoa Initiative to eliminate cocoa related deforestation and restore forest areas.

Global initiatives on deforestation

Many efforts are being made to decouple commodity production from deforestation. While meeting international targets associated with deforestation, particularly those adopted before 2020 (see Table 1) have proved challenging, they have stimulated action by a wide range of companies producing, trading and using commodities associated with deforestation. Commitments to eliminate or reduce deforestation in corporate supply chains have become common in companies trading in and using timber, palm oil and cocoa; they are less common for other commodities. An analysis of 675 companies in 2021 disclosing forest risk in their supply chains to CDP found that 66% possessed a policy related to deforestation, while 38% had a general or commodity-specific company-wide no-deforestation / conversion policy (CDP/AFI, 2022^[17]).

Table 1 provides examples of the wide range of international initiatives on deforestation associated with agricultural and timber supply chains since 2010;² these include initiatives such as soft law, SDGs, private sector initiatives, as well as multi-stakeholder initiatives.

Table 1. Examples of international initiatives on deforestation

Date	Organisation / Initiative	Commitments
2008 through 2015	UN Framework Convention on Climate Change – REDD, then REDD+, Framework	Guide activities in the forest sector that reduce emissions from deforestation and forest degradation, as well as the sustainable management of forests and the conservation and enhancement of forest carbon stocks in developing countries.
2010	Consumer Goods Forum (global industry network of retailers, manufacturers and service providers)	Zero net deforestation in membership's supply chains by 2020 in key commodities: soy, palm oil, timber / paper and pulp, beef.
2012	Tropical Forest Alliance (global partnership of governments, companies, civil society, Indigenous Peoples, local communities, UN agencies)	Reduction in tropical deforestation associated with the sourcing of commodities such as palm oil, soy, cattle products and paper and pulp. Promotes and supports

Date	Organisation / Initiative	Commitments
		regional multi-stakeholder initiatives.
2014	New York Declaration on Forests (signatories now include over 200 national and local governments, companies, and civil society, community and Indigenous Peoples' organisations)	At least halve the rate of loss of natural forests globally by 2020, strive to end natural forest loss by 2030; support private-sector goal of eliminating deforestation from production of agricultural commodities by no later than 2020; significantly reduce deforestation derived from other economic sectors by 2020.
2015	UN Sustainable Development Goals	SDG 15.2: "By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally." (Also SDG 12.6: "Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.")
2020	Consumer Goods Forum Forest-Positive Coalition of Action	Coalition of major companies aiming to support deforestation- and conversion-free enterprises through multi-stakeholder, integrated land use initiatives in key production landscapes. Commodity-specific roadmaps for action for soy, palm oil, cattle and pulp and paper.
2021	Glasgow Leaders' Declaration on Forests and Land Use (signed by 141 countries at the 26th UN Climate Change Conference [COP26])	"Work collectively to halt and reverse forest loss and land degradation by 2030 while delivering sustainable development and promoting an inclusive rural transformation". Specific commitments include to: "facilitate trade and development policies, internationally and domestically, that promote sustainable development, and sustainable commodity production and consumption, that work to countries' mutual benefit, and that do not drive deforestation and land degradation".
2021	Forest, Agriculture and Commodity Trade (FACT) Dialogue Roadmap for Action (statement by 27 governments and EU (representing largest producers and consumers of internationally traded agricultural commodities) at COP26)	Aims to promote sustainable development and trade of agricultural commodities while protecting and sustainably managing forests and other critical ecosystems; Includes indicative actions on trade and market development; smallholder support; traceability and transparency; and research, development and innovation.

A number of consumer countries have seen the emergence of initiatives aimed at ensuring that the entire national market is supplied with certified sustainable commodities – particularly for palm oil and cocoa – by a target date; sometimes these voluntary initiatives include governments too. Similar alliances have developed in several producer countries, such as the Zero-Deforestation Agreement on Palm Oil in Colombia. A number of producer countries have also developed their own national standards and certification schemes for specific commodities; examples include the Indonesian and Malaysian Sustainable Palm Oil standards and the African Standard for Sustainable Cocoa.

Recent years have also seen the emergence and uptake of commodity-focused multi-stakeholder roundtables and engagement platforms for collective action – such as the Africa Sustainable Commodities Initiative – and voluntary sustainability standards and associated certification schemes (see Annex A). Several financial institutions have adopted commitments not to provide finance for activities associated with deforestation.³

Legislation on deforestation and risk-based due diligence

In response to rising concerns over climate change and deforestation, some governments are introducing obligations for enterprises to conduct due diligence to address a range of risks in their operations and supply chains, including deforestation. These obligations complement the initiatives mentioned above and include:

- General corporate obligations of due diligence, applying to an enterprise's entire operations and supply chains, not specific to any sector or product, and not linked to placing products on the market.
- Requirement for due diligence to be undertaken with regard to particular criteria (e.g. legal production, or zero-deforestation) before specified products can be placed on the market, imported or exported.

The implementation of risk-based due diligence as described in this Handbook, according to the OECD-FAO Guidance may support enterprises to meet such obligations.⁴

Due diligence in agricultural supply chains

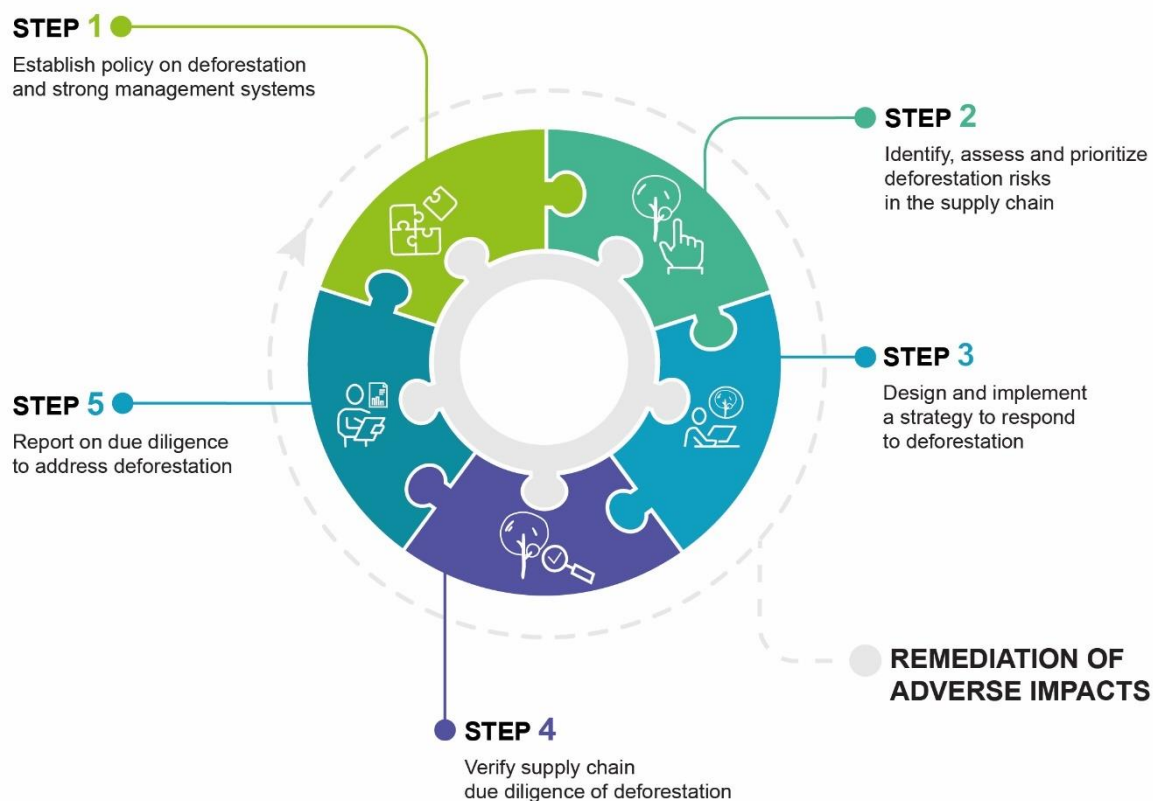
This chapter introduces the overall concept of risk-based due diligence as set out by the OECD-FAO Guidance for Responsible Agricultural Supply Chains.

“Due diligence” is understood as the process through which enterprises identify, prevent, mitigate and account for how they address the actual and potential adverse impacts of their own operations, their supply chain and other business relationships. This is the approach to due diligence recommended by the *OECD-FAO Guidance for Responsible Agricultural Supply Chains* (OECD-FAO Guidance) and the cross-sectoral *Due Diligence Guidance for Responsible Business Conduct* (OECD, 2018, p. 15^[18]). Due diligence in this context is thus an integral part of business decision-making and risk management. The due diligence framework of the OECD-FAO Guidance can be used by all enterprises operating along agricultural supply chains, from upstream production to downstream retail.

The OECD-FAO Guidance due diligence framework

The risk-based due diligence framework in the OECD-FAO Guidance describes the steps an enterprise can take to identify, prevent and address risks in their operations, supply chains and business relationships. Figure 3 illustrates the five-step process, as well as integrating the *Remediation of Adverse Impacts*, which forms a sixth step within the cross-sectoral Due Diligence Guidance for Responsible Business Conduct. The protection of forests and the avoidance of deforestation are mentioned on several occasions in the OECD-FAO Guidance but are not discussed in detail. As such, this Handbook supplements the OECD-FAO Guidance by using risk-based due diligence to identify and address deforestation risks in global agricultural supply chains.

Figure 3. The OECD-FAO Guidance due diligence framework



Source: Adapted from (OECD-FAO, 2016^[11]) and the (OECD, 2018^[18]).

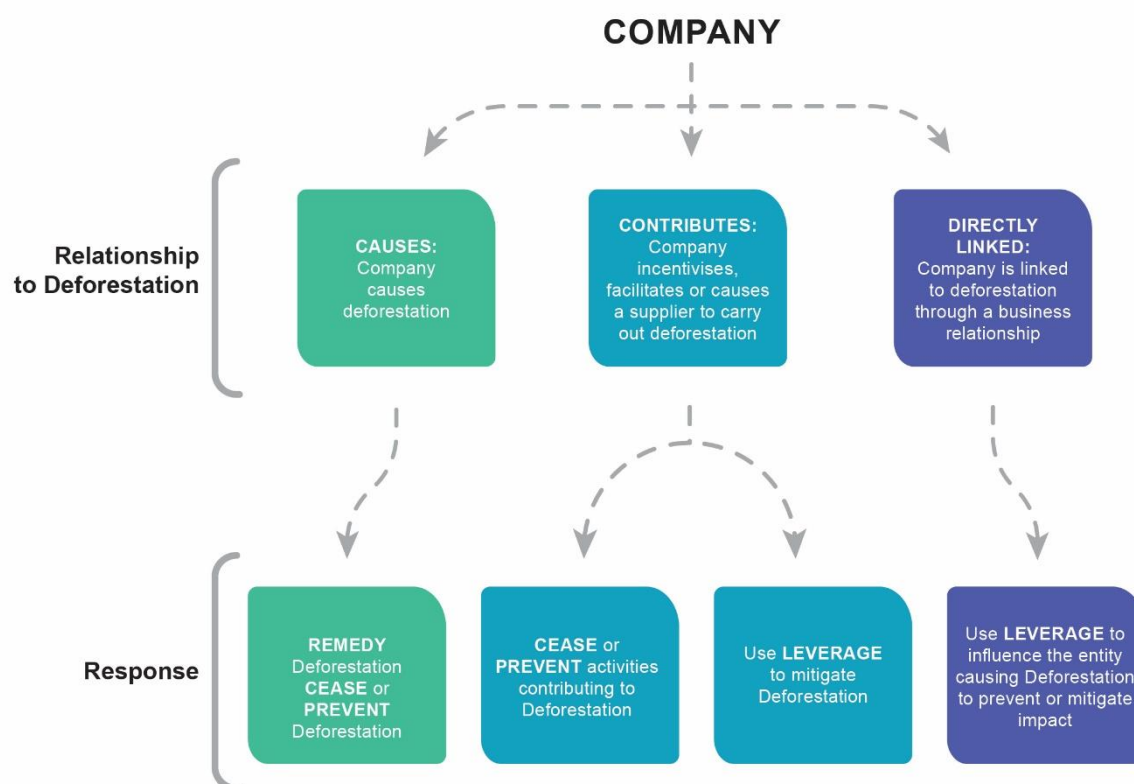
What is meant by “risk” for due diligence

For many enterprises, the term “risk” means primarily risks to the enterprise – financial risk, market risk, operational risk, reputational risk, etc. In the field of responsible business conduct, risk refers to the severity and likelihood of adverse impacts on people, the environment and society that enterprises cause, contribute to, or to which they are directly linked through business operations and sourcing practices. In other words, it is an outward-facing approach to risk. It is important to note that there are many potential underlying drivers of deforestation. Factors such as poverty, human rights abuses, the rights, resources and capacities of local communities and Indigenous Peoples, the uncertain status of land and forest tenure rights, corruption and weaknesses in governance and law enforcement may all act as root causes for deforestation risks.

Defining the involvement of an enterprise with regard to adverse impacts

An enterprise can either cause adverse impacts, contribute to them, or be directly linked to them through its operations, products and services by a business relationship (see Figure 4). This understanding of the relationship of the enterprise to deforestation, or the risk of deforestation, is important, as it guides an enterprise on what it is expected to do in response to the impact. Depending on its relationship to the impact, taking action to respond to deforestation or deforestation risks could mean taking steps to directly remedy the impact, cease activities causing the impact or prevent the potential impact, or use leverage to influence the entity causing the impact.

Figure 4. Addressing adverse impacts based on examples of relationships to the impact



Source: Adapted from OECD (2018^[18]), OECD Due Diligence Guidance for Responsible Business Conduct and OECD-FAO (2016^[11]), OECD-FAO Guidance on Responsible Agricultural Supply Chains, Box 1.2.

An enterprise *causes* an adverse impact if the enterprise's actions by themselves result in the impact. For example, if an agricultural enterprise produces crops on land that it has cleared of forest, it is understood to cause that impact. Impacts can also result from inaction (omission).

An enterprise *contributes to* an adverse impact if its activities, in combination with the activities of other entities, result in the impact, or if the enterprise causes, facilitates or incentivises another entity to cause an adverse impact. Contribution must be substantial, meaning that this does not include minor or trivial contributions. For example, an agricultural company may be contributing if it acquires a land concession for development of a plantation, knowing that the land will need to be cleared of forests in order to grant the concession.

An enterprise *is directly linked to* an adverse impact when the impact is linked to its operations, products or services by a business relationship. An enterprise's business relationships include entities in the supply chain that are directly linked with its operations, products and services. Business relationships include relationships beyond contractual, first tier or immediate relationships. This could include for example a producer, processor or trader in the supply chain from which the enterprises receives its products or raw materials.

Step 1: Establish a policy on deforestation and strong management systems

Step 1 of the OECD-FAO Guidance is about establishing strong corporate management systems and policies, which in turn support all the subsequent steps of the OECD-FAO due diligence framework. This chapter outlines how Step 1 can help support companies' deforestation commitments.

Strategic questions for enterprises

- What level of ambition do we as a company have on deforestation? What is our definition of forests? Have we considered a deforestation cut-off date in our sourcing practices (see Glossary for definitions)?
- Does our policy meet or exceed legislation regarding forest protection in our home country, country of production and key export markets?
- Does our policy meet expectations from investors, legal advisors, local communities and civil society?
- Do senior executives in the company (including the Board) understand: (1) the commitments on deforestation the company has; (2) the ramifications of choosing a particular policy; (3) the systems required to implement such a policy (e.g. revising existing contracts and relationships, budget and personnel implications); and (4) the costs of not addressing deforestation for the company (direct or indirect impacts on production and revenues), and globally (in terms of climate change and biodiversity loss and the associated medium- and long-term insecurity of supply of agricultural commodities)?
- Has a lead focal point in the company been appointed to co-ordinate and manage the implementation of the due diligence approach to responsible sourcing (including on deforestation commitments), together with other company departments (e.g. legal, public/corporate affairs, procurement, marketing)? Is there adequate communication between them?
- Which suppliers and other stakeholders should we engage with in developing our commitments against deforestation? Do we have vulnerable producers, such as smallholders, in our supply chains that require specific support with compliance with the company's policy and regulatory requirements?
- Are company key performance indicators (KPIs) linked to achieving deforestation-related due diligence objectives part of our management systems?
- Which external due diligence systems or processes are we using to support our internal due diligence management (e.g. OECD-FAO Guidance, industry codes, commodity certification systems/schemes, audit protocols, etc.)?

Establish or update sustainability policies on deforestation and integrate into enterprise processes

The following key elements have been identified as important when developing a policy on deforestation:

- The policy applies across the entire company (including its subsidiaries) and its supply chains and ensures that all relevant departments work together to deliver a common commitment towards eliminating deforestation through responsible production and sourcing practices.
- It sets measurable targets for reducing deforestation and the risk of deforestation acceptable in the enterprise's operations, supply chains and business relationships. For example, the objective can be to achieve zero deforestation, or zero illegal deforestation, or a reduction in deforestation levels to be achieved by a specified date. The definition of the objective includes clear time-bound targets and cut-off dates and definitions of terms such as "forest", "deforestation" and "forest degradation" (see Glossary for definitions).

- Targets and definitions can often be derived from collective commitments the enterprise has entered into, international and national agreements and commitments, national legislation, industry association guidelines, the expectations of investors, or voluntary sustainability standards in certification systems (See Annex A for further resources).
- The policy is risk-based, meaning it addresses the most significant risks and impacts first, taking into consideration likelihood of an impact as well as the scale, scope and irremediable aspects of the impact.
- The policy is reviewed and adapted on a regular basis in light of new sourcing areas, shifting patterns of deforestation and increasing knowledge about deforestation risks in the supply chain and international standards and national legislation.

Embed policy on deforestation in oversight bodies and management systems and different company functions

Practices should be consistent throughout the operations of the enterprise, including in all the departments or units which may take decisions affecting commodities and products potentially associated with deforestation, including in particular the purchasing and procurement functions. The deforestation-related procedures should be consistent with, and integrated within, any other due diligence policies the enterprise may have.

Incorporate expectations and policies into engagement with suppliers and other business relationships

Since due diligence applies throughout an enterprise's supply chains and business relationships as well as to its own operations, regular communication with suppliers and other business partners is critical. For products and supply chains with associated high risk of deforestation, the enterprise should:

- Communicate key aspects of its policy on deforestation to suppliers and other relevant business relationships. Long-term relationships with business partners can increase leverage to encourage the adoption of such a policy and improve transparency.
- Include conditions and expectations on deforestation due diligence in supplier or business relationship contracts, supplier codes of conduct or other forms of written agreements, tailored to suppliers' capacities.
- Develop and implement pre-qualification processes on deforestation due diligence for suppliers and other business relationships, where feasible, adapting such processes to the specific risks and circumstances they face.
- Provide adequate resources, capacity-building and training to suppliers and other business relationships to help them understand and apply the policy and implement due diligence in relation to deforestation. This could include, for example, a standardised reporting framework for suppliers. Some suppliers, such as smallholder farmers, will need greater levels of support than others.
- Seek to understand and address barriers arising from the enterprise's way of doing business that may impede the ability of suppliers and other business relationships to implement the due diligence policy in relation to deforestation, such as the enterprise's purchasing practices and commercial incentives.

Enterprises may face practical and legal limitations to how they can influence or affect business relationships to prevent, cease, or mitigate adverse impacts on forests, or to remedy them. Enterprises can seek to overcome these challenges to influence business relationships through contractual

arrangements, pre-qualification requirements, voting trusts, license or franchise agreements, and also through collaborative efforts to pool leverage in industry associations or cross-sectoral initiatives.

Implementation plans developed in co-ordination with business partners and involving, where appropriate, local and central governments, international organisations, local communities and civil society, can also improve compliance, in particular by offering capacity-building and training. Industry associations and multi-stakeholder initiatives may often be able to provide support for many of the steps described above.

Establish control systems along the supply chain

Establishing systems to enable the enterprise to monitor the implementation and impacts of its policy on deforestation is critical to the credibility and effectiveness of the policy and to good relationships with stakeholders, including investors and governments. This entails:

- Creating verification procedures to undertake regular independent and transparent reviews of compliance with the policy; this may include ongoing supplier engagement and monitoring, as well as internal and independent third-party audits (the latter is preferred where the risk of association with deforestation is higher), and covers both the enterprise and its suppliers.
- Establishing monitoring and control systems for the chains of custody of the commodities and products the enterprises identify as potentially associated with deforestation. This is described in more detail in Step 4 of the OECD-FAO Guidance (verifying due diligence).

Typically, these steps will take place at the same time, or soon after the enterprise has started to conduct supply chain mapping as per Step 2 of the OECD-FAO Guidance (identifying risks).

Establish an operational-level grievance mechanism, in consultation and collaboration with relevant stakeholders

Grievance mechanisms, which should include both early warning risk-awareness and complaints systems, can help alert enterprises to deviations from their policy on deforestation in their activities or those of their suppliers or other business relationships, help them to identify and mitigate risks, including by improved communication with stakeholders, and provide a mechanism to prevent and remediate conflicts. Grievance mechanisms can also incorporate a channel for feedback and suggestions. They can be established at the level of a project, an enterprise or an industry. Enterprises can both establish their own grievance mechanisms and participate in other grievance mechanisms. It is important that grievance mechanisms be accessible, especially, where relevant, to local stakeholders including women and other vulnerable and marginalised groups. Grievances should be handled within a reasonable timeframe and anonymity respected when requested.

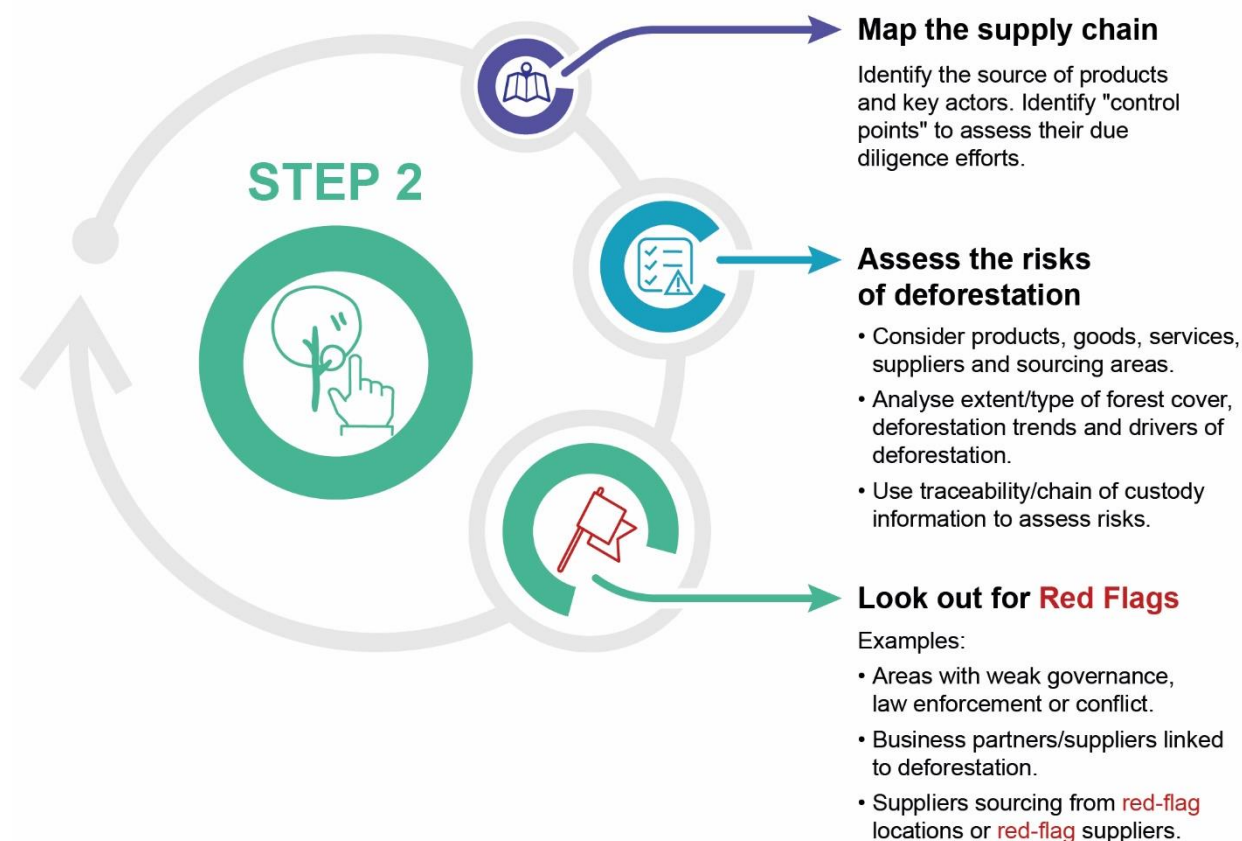
Suggestions for SMEs

- Decide what level of policy commitment you are prepared to adopt given national laws and international commitments, and company commitments to customers.
- Choose the definitions of “forest” and “deforestation” you want to use and the cut-off date(s). (Sectoral initiatives or other SMEs’ policies and commitments may provide useful models).
- Decide on how the policy commitment will be operationalised according to your financial and human resources.
- Make your commitments known; this can be through a written commitment or a stand-alone statement or as part of your business vision, value statement, or responsible sourcing policy.
- Engage in multi-stakeholder platforms on sustainable commodities that aim to minimise deforestation through collective action.
- Mention your limitations and risk prioritisation approach, including actions you will take if you discover that any business partner is sourcing from deforested areas.
- Reference national or regional commitments on deforestation and forest degradation in company policy.

Step 2: Identify, assess and prioritise deforestation risks in the supply chain

Step 2 of the OECD-FAO Guidance is about examining the supply chain and mapping the risks of deforestation within it, to enable enterprises to determine their priorities for action. Under the OECD-FAO Guidance, enterprises are expected to identify general areas where the risk of adverse impacts is most significant and to prioritise due diligence accordingly. High-risk suppliers or suppliers operating in high-risk areas will warrant more scrutiny.

Figure 5. Identify, assess and prioritise deforestation risks in the supply chain



Strategic questions for enterprises

Mapping the supply chain:

- Which departments within our company are responsible for supply chain mapping and prioritisation? Do they have the capacity and budget to meet company commitments on deforestation?
- What systems or processes do we currently have in place to map our operations and supply chains to identify deforestation risks (e.g. desk-based research, heat maps, supplier questionnaires, satellite data, field visits)?
 - How far upstream from our enterprise have we mapped the supply chain?
 - Do we have a plan to map the key control or “choke” points within those supply chains that are associated with high risks of deforestation? (See the Glossary)
 - Do we use a risk-based approach to prioritise which entities in the supply chain and which parts of the supply chain should be mapped in detail?
 - Are we ensuring that our identification efforts extend upstream to agricultural production?
 - Are there parts of the supply chain where mapping is impeded by a lack of transparency (e.g. purchases from the spot market)?
 - What can we do to increase transparency (e.g. engage with suppliers, stop buying from the spot market, etc.)?
- What level of traceability or chain of custody can we have in place for our products?
- Where does our information come from (e.g. internal systems/tracking, supplier feedback, external data; collaboration with industry groups, open-source deforestation satellite data)?
 - Do we have up-to-date maps on forest cover and deforestation frontiers in the areas from which we source our products and raw materials?
 - Which departments/individuals have responsibility for mapping deforestation risks and maintaining quality information? Do we rely on external public information for this or on a contract with a specific provider?
 - How reliable is this information, and how can we verify it?
 - How traceable are our commodities and products?
- What are our partners doing to identify deforestation risks? How can that information be strengthened, co-ordinated and streamlined in our approach?

Assess and prioritise the supply chain:

- What do we consider and define as the most salient or priority deforestation risks? Which are our highest risk suppliers or other business partners?
- What steps do we take to verify our supply chain data and ensure that it is current? Do we triangulate data, conduct supplier or site visits, conduct audits, use real-time data/tech, collaborate or exchange information with industry groups, etc.?
- Against which benchmarks and standards do we assess risks?
- How do we assess and prioritise the risks of deforestation? Do we use a system of “red flags” (see below)? Do we provide support to local farmers and enterprises, and what form does this take (i.e. training, resources, equipment)?

Map the supply chain by identifying the various actors involved, including immediate suppliers and business partners, and the sites of operation

Mapping and prioritizing should start with a high-level overview of company products, services and suppliers. This stage in the process involves establishing the sources of all the commodities and products covered by the enterprise's policy on deforestation, in order to understand at a high level the risks associated with their production and sourcing. The extent of information collected on suppliers and business partners depends on the severity of the deforestation risk and how closely they are linked to the identified risk.

Mapping the supply chain includes identifying:

- The source of the commodities or products derived from these commodities, including the country of production, source area and, where appropriate, the plot of land of production. This can help to identify the countries or areas most at risk of deforestation and enable the enterprise to focus on high-risk areas or suppliers in more detail. The legal and political context of the source area can be as important as trends in deforestation or agricultural production. Enterprises should carry out due diligence in locations which feature one or a combination of the following “red flags”:
 - Areas defined or known as protected areas, collectively managed areas (under tenure rights of local communities or Indigenous Peoples), high conservation value areas, or high carbon stock areas (e.g. peat forests).
 - Areas with high levels of rural poverty and a reliance on agriculture as a main form of income.
 - Areas where local communities and Indigenous Peoples are present
 - Areas which are considered as at high risk of conflict
 - Weak protection of human rights, Indigenous Peoples' rights or poorly defined or contested land tenure rights (see Box 1)
 - Weak governance and implementation of the rule of law, and corruption
 - Weak levels of forest protection by national or local governments.

Box 1. Land tenure issues

Issues of land tenure (including the implied bundle of rights – from access to ownership) are central to the debates around halting deforestation. A significant portion of the world's remaining tropical forests are customarily owned by Indigenous Peoples and traditional communities and other customary rights-holders. Enterprises seeking to access land for commodity production must respect the rights of those who already own, occupy or otherwise use it. They may only acquire access to such land through a process that first recognises these rights. Sometimes this may also include national or local public authorities.

The rights of those without formal property rights to the lands should also be recognised; this includes those of tenants, sharecroppers, farm-workers, or those with informal rights to access and use land and natural resources. These informal rights can include women's tenure rights, which are commonly subsumed under those of the male head of household.

The tenure rights recognition process frequently poses challenges. It may not always be clear who has legal title to the land, customary rights may sometimes conflict with statutory rights, and statutory rights may sometimes not align with international human rights obligations. Many certification schemes and other tools (for example, the High Carbon Stock Approach), set out standards for respecting land tenure and processes for determining it, including, for example, participatory mapping carried out jointly by the enterprise and communities, although certification by itself does not always guarantee compliance with these standards.

Free, prior and informed consent (FPIC) can be an important element in this process. As set out in Annex B of the OECD-FAO Guidance, FPIC involves agreeing a consultation process with affected Indigenous Peoples; consulting and agreeing on what constitutes appropriate consent (taking into account representation of women and other marginalised groups); and engaging in the process of seeking consent before activities commence (if consent is given). This is an iterative and ongoing process rather than a one-off discussion; continuous dialogue will generate trust and a balanced agreement, or non-agreement, that will benefit the investment across all phases of the project, or provide a clear indication that it should not go ahead (FAO, 2014^[19]; FAO, 2016^[20])

More detail on responsible tenure governance is available in the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* officially endorsed by the Committee on World Food Security in 2012.

In addition to red flag locations, companies can use a system of “red flags” for:

- Sectors or products – commodities known often to be linked to deforestation or forest degradation);
- Business partners – suppliers known to trade in commodities or source from forests; suppliers
 - Known to have a poor track record vis-a-vis deforestation
 - Known to have sourced commodities from red flag locations (see above)
 - Known to operate in red flag locations (see above)
 - Known not to have observed internationally agreed standards such as those contained in the OECD-FAO Guidance.

Companies can also prioritise certain products, geographies and suppliers to conduct further, more in-depth assessments. This approach helps companies to build transparency over the supply chain in those prioritised areas, products and suppliers.

Identifying the various actors involved in the supply chain, including suppliers and business partners and prioritizing using a risk-based approach. Such activities may be challenging if products are supplied through local traders or on spot markets. Mapping the supply chain will require dialogue with traders and suppliers, in particular those operating at the **control or choke points** of the supply chain. Enterprises can identify control points such as processing points where there are relatively few enterprises that handle a majority of inputs. Examples include commodity processors, commodity traders, wholesalers, exporters and/or commodity exchanges.

Repeating this process before making any new investments or pursuing business activities that result in changes in the supply chain.

Establishing a **system of controls and transparency** throughout the supply chain includes:

- Assessing the type and quality of supply-chain traceability or chain of custody offered by suppliers, and any complaints or grievances lodged against any of the actors in the supply chain, including suppliers and business partners.

- Approaches to traceability include tracing to origin; tracing to a supplier that has a robust traceability and due diligence system of its own (with the downstream company responsible for assessing the robustness of this system); tracing to a jurisdiction that can demonstrate a negligible risk of commodity-linked deforestation across the entire jurisdiction; and using a credible certification or chain of custody system.

The extent of information collected on suppliers and business partners depends on the severity of the deforestation risk and how closely linked to the identified risk they are. For areas at high risk of deforestation, a higher degree of traceability or chain of custody to the farm level will be needed; in some areas this will be challenging. The potential gap between the level of deforestation risk and the granularity of the information on the production area will need to be taken into account when defining the risk mitigation strategy.

Different traceability systems exist, including those used in many certification schemes (see Annex A for further information on Certification Schemes). Depending on the granularity of the information they monitor, they offer diverse levels of confidence regarding the link between the commodities and the place of production and hence the risk of deforestation:

- Under the *identity preserved* model, products from a single identifiable certified source are kept separate from uncertified products, and from certified products from other sources, throughout the supply chain. The plot of land of production is known.
- Under the *segregated* model, certified products from different certified sources are mixed together but kept separate from uncertified products.
- Under the *mass balance* model, certified products are mixed with uncertified products but the proportions are monitored administratively; users can advertise their product as partially certified (or mixed), usually with a specific percentage figure.
- Under the *book-and-claim* model, certified products are not kept apart, but suppliers of certified products sell credits to users; while the user may not actually be using any certified products, they do contribute to the costs of responsible production.

Box 2 lists the types and some potential sources of information needed by enterprises for these purposes.

Box 2. Types and potential sources of information to map the supply chain and assess deforestation risks

Types of information:

- Names and locations of farmers, local traders, processors and any other enterprises in the supply chain that a company further downstream wants to trace to
- Average production volumes of farms or jurisdictional area supplying the commodities, to detect possible leakages between production areas with different deforestation risks
- National production and trade data for the commodity in question; this may help in detecting possible leakages such as hidden imports from a third country in supply areas close to the borders
- Processing facility information (e.g. palm oil mill, soybean crusher sourcing areas)
- Where appropriate, geolocation data (geographic co-ordinates) of the plot of land on which the commodities are grown, by point co-ordinates or polygon mapping of the plot of production, farm boundaries or larger area, such as village or landscape or jurisdiction
- Farm mapping and registration databases
- Legal frameworks for the production of commodities and products purchased by the company and for forest conversion in the countries of production, levels of governance and law enforcement, legality compliance, respect for human rights and land rights, and corruption
- Certification scheme data, including, for example, volumes of products fully certified, and of products certified to more limited criteria
- Visual, isotopic or DNA analyses of samples (these can help distinguish between species, e.g. for timber, and, for some commodities, between different geographic origins)

Potential sources:

- Purchase orders and invoices, batch numbers of commodities and products
- Supplier questionnaires, including their sub-suppliers
- On-site visits to production, transformation and storage areas
- Company and industry association programmes, public summaries of audit reports and product claims or labels, including voluntary certification and legality verification schemes
- Information generated through jurisdictional or landscape approaches
- Private or public remote sensing providers
- Supply chain mapping and transparency tools, e.g. TRASE, SPOTT, FLEGT IMM, Open Timber Portal, commercial providers, sectoral initiatives, co-operation projects
- Traceability systems, e.g. commercial or national traceability systems, Independent Forest Monitoring, Timber Legality Assurance Systems
- Specific tools monitoring and assessing deforestation risk, e.g. Global Forest Watch
- Agriculture and trade statistics from national or international databases, e.g. FAOSTAT, UN Comtrade; land registries, and other sources of land data such as Land Matrix or Open Land Contracts.
- FAOLEX (a comprehensive legislative and policy database)

Note: All of the initiatives listed above approach deforestation according to different models or approaches; efforts should always be made to verify their reliability.

Assess risks of deforestation associated with the products, goods, services, suppliers and sourcing areas

Once the sources of the commodities and products covered by the enterprise's deforestation policy are identified, and the sourcing area is known, it becomes possible to assess the risk that their production has been associated with deforestation.

Likelihood and severity. The significance of an adverse impact is a function of its likelihood and its severity. The severity of impacts can be analysed according to their scale, scope and irremediable character:

- The *scale* of the adverse impact characterises the gravity of the impact on forests as a whole, or on particular types of forests (e.g. protected areas, high conservation value areas, high carbon stock areas) or the extent of changes in tree species composition.
- *Scope* concerns the reach of the impact, for example the extent of damage to the forest by total area or by impacts on specific areas or species.
- *Irremediable character* means any limits on the ability to restore the forest, or forest-dependent species, or the people living, working or depending on it, to a situation equivalent to their situation before the adverse impact. Special attention should be paid to the substantial challenges of restoring the social and environmental values and functions of a forest.

The process of prioritisation is ongoing, and in some instances new or emerging adverse impacts may arise and be prioritised before moving on to less significant impacts.

The risk assessment should combine information on:

- Extent and type of forest cover in the sourcing area
- Trends of deforestation in this area (in general, not just for specific products)
- Information on direct drivers of deforestation
- Information on indirect drivers of deforestation
- Levels of traceability
- Complexity of the supply chain

The higher the extent and risk of deforestation, the greater the level of detail that will be needed. Where the risk is very low, an assessment at the country or regional level may be adequate; where it is higher, the assessment will need to focus on smaller areas, and may require detailed geolocation information to the farm level. Addressing any information gaps for high-risk source areas should be a high priority.

Forest cover. This should include assessments of the proximity of suppliers to remaining forest land within the supply area (including within the farms themselves) and adjacent to it, which should help the enterprise to assess the risk of future deforestation. For example, a region with low rates of deforestation but with a significant amount of standing forest is a higher risk compared to a region with previously high rates of deforestation but no forest left.

Deforestation trends. An increasing range of sources of information on deforestation rates and incidences are now available (see Box 3 and the Glossary). Deforestation fronts move over time and their dynamics are not linear. The risk of deforestation in supply areas (which may themselves often change) should therefore be updated on a regular basis, and the use of deforestation alert services should be considered.

Direct drivers. A direct driver of deforestation is the direct cause of the forest loss and associated land use change. Estimating the likelihood of the conversion of forests to cropland or grassland being caused by the extension of production of the commodity used by the enterprise is a key element of the risk assessment.

Underlying/Indirect drivers. Indirect drivers, sometimes called underlying drivers, include the policy, legal, economic, social or contextual causes that induced the land use change. For instance, if the evidence shows that an increased demand and/or increased prices for a specific commodity have driven deforestation, and commercial forecasts indicate that this trend will remain, then the risk of deforestation will remain high. For another example, where standards of forest and land use governance and law enforcement are weak, the risk of deforestation will be higher than where they are stronger.

The complexity of the supply chain, including the number of intermediate steps within it, and the risk of mixing of products from unknown or potentially high-risk sources. This includes identifying the various actors involved in the supply chain, including suppliers and business partners. This is important: the greater the number of links in the chain, the higher is the risk, since every link potentially increases the chance of products associated with deforestation entering supplies. The type of links – e.g. intermediary traders sourcing directly from farms and selling the commodities on to the next link in the supply chain – are also important, particularly where the commodity is obtained from a large number of sources such as smallholder farmers, who may need support in complying with the enterprise's policy.

Where it is not feasible to address all identified impacts, an enterprise should prioritise action based on the severity and likelihood of the adverse impact. Once the most significant impacts are identified and dealt with, the enterprise should move on to address less significant impacts.

Box 3. Potential sources of information on deforestation and deforestation drivers

- Remote sensing through satellite or radar data, e.g. Global Forest Watch, Terra-i, Earth Resources Observation and Science (EROS) Center; national systems (e.g. PRODES, Brazil; Mapbiomas; IDEAM, Colombia; Geobosques, Peru)
- Assessments of the status of governance and law enforcement in the source country, e.g. World Bank Worldwide Governance Indicators, Transparency International Corruption Perceptions Index or Freedom House Index
- Deforestation alerts, e.g. Global Forest Watch GLAD alerts, RADD Forest Disturbance Alert
- FAO Forest Resources Assessment series
- Local communities, Indigenous Peoples and civil society organisations; Independent or community forest monitors (empowering community members to act as forest monitors can be an effective way to collect data and raise the alarm on deforestation)
- Country or landscape risk assessments, e.g. those conducted by LandScale
- Information collected through early warning and grievance mechanisms
- Studies of deforestation drivers, Measuring Reporting and Verification (MRV) reports, e.g. in national REDD+ strategies
- Tools provided by civil society, e.g. the Cocoa Accountability Map by Mighty Earth
- For further resources please see Annex A.

Risk assessments: what types are there and who does what?

Several types and levels of risk assessments are possible.

- **Context risk assessments:** At country or regional level, by assessing the regulatory framework, political context, civil liberties and socio-economic environments.
- **Site-level risk assessments** aim to understand the factual circumstances of the operations of business partners in order to assess the scope, severity and likelihood of risks at the site level.

Assessments can include checking volumes of commodities produced in particular areas against allowable volumes, undertaking stakeholder consultations, monitoring by third parties such as civil society organisations, and organising visits to the farms and/or processing facilities.

- **Upstream enterprises** (such as farms and plantations) may establish on-the-ground assessment teams for generating and sharing verifiable, reliable and up-to-date information on the extent of deforestation. These enterprises also need to ensure that they respect legitimate land tenure right holders (see Box 1). They should provide the results of their risk assessments to downstream enterprises.
- **Downstream enterprises** should not only identify risks in their own operations but also, to the best of their efforts, assess the risks faced by their suppliers and sub-suppliers. They can evaluate the latter by assessing the due diligence carried out by their suppliers or by directly assessing the operations of their suppliers, for instance by conducting visits to farms and local communities. Tools such as deforestation alerts can help to spot-check suppliers' operations for potential association with deforestation. Information should be sought both on the suppliers' systems and the volumes of products they are supplying. Participating in industry-wide schemes that assess the compliance of business partners with deforestation policies and provide relevant information can support these assessments.
- **Financial enterprises** should carry out due diligence with regard to their clients and investments. The nature and extent of the due diligence will depend on the size and nature of the enterprise's investment portfolio and its relationship to specific clients and investments (e.g. the ownership share in the company, tenure of investment, access to relevant information and the likelihood that meaningful influence may be exercised). Where financial enterprises have large numbers of clients and investee companies, they are encouraged to prioritise efforts based on risk assessments. Financial enterprises should seek to prioritise the most severe deforestation-related impacts for due diligence while continuing to monitor risks, evaluate prioritisation decisions and build on their actions to the extent possible and necessary over time, to cover a broader range of clients and investee companies and actions.

Suggestions for SMEs

All SMEs:

- Identify your commodity focus and prioritise your mapping efforts accordingly.
- Create a list of your direct and indirect (outsourced) suppliers and identify which ones may require greater scrutiny/due diligence actions in terms of deforestation (by geography/location, type of commodity, parts of supply chain, company size).
- Information on direct and indirect suppliers can be collected in a variety of different ways to minimise costs, including desk-based research using existing publicly disclosed information online, working with third-party initiatives or certification schemes, working collectively as part of industry associations. Some industry collaborations allow SMEs to share risk assessment, traceability and sometimes monitoring information.
- Ask your direct suppliers to send you information on their due diligence practices, sourcing practices and deforestation policies; assess those approaches to better understand which suppliers may not have effective measures to consider deforestation risks.
- Consider having regular calls, or check-ins with upstream suppliers operating at control points of the supply chain to better understand how they are identifying, preventing and mitigating deforestation impacts in the commodities that you have prioritised.

In addition, upstream SMEs can:

- Know where your product comes from, and how it is grown and sourced; it may be more feasible to focus on particular source landscapes rather than wider areas.
- Hold meetings with cooperatives, farmers or other producers, and Indigenous Peoples and local communities, who are at the front lines of production and deforestation risks.
- Build your leverage: collaborate with other SMEs that source from the same producers to identify and prioritise deforestation risks in the sector.
- Seek advice and information from business associations, certification schemes (private or national), international organisations (e.g. OECD, FAO, UNEP), government entities, NGOs, trade unions and relevant multi-stakeholder initiatives.

Step 3: Design and implement a strategy to respond to deforestation

Step 3 of the OECD-FAO Guidance is about responding to the findings of risks of deforestation through reporting to designated senior management and designing and adopting a risk management plan. The plan should cover appropriate risk mitigation and prevention measures. Enterprises should ensure that risks are addressed, and that they are taking steps to tackle adverse impacts that have occurred.

Figure 6. Design and implement a strategy to respond to deforestation



Strategic questions for enterprises

Designing the strategy

- Do we have a strategy with clear actions to respond to the identified deforestation risks? How often do we need to update it?
- What activities do we have the capacity to undertake in response to deforestation risks and impacts, and any forthcoming legislation?
- How have we engaged with external stakeholders in developing our strategy?
- How do we ensure that our strategy is up to date and working – e.g. through an annual review process, or collaboration with industry players?
- To what extent can we work directly with producers? What assistance and support do they need (with special attention being paid to independent and contracted smallholders)?
- Do we understand when we need to offer remedy (e.g. “cause” cases)? Have we considered the types of remedy that we could offer?
- What steps can we take to innovate in our risk mitigation plans? Issues include the role of technology, cross-sector collaboration, engagement with governments at different stages of the supply chain, engagement with Indigenous Peoples and local communities.

Implementing the strategy

- Who within our company is responsible and accountable for the implementation of this strategy? Have we identified people in each department who are responsible for doing their part to reduce the identified risk? How is the Board kept apprised of our actions?
- Do we have an in-country or regional presence, or will we have to bring in a third party to implement activities on our behalf? How often do they report back on progress?
- What steps can we take to increase overall leverage in the supply chain to change the business behaviour of suppliers and address root causes of deforestation (e.g. are we engaging with governments and organisations in producing countries, including OECD National Contact Points for RBC and FAO country focal points)?
- To what extent do we need external partners to create impact on the ground?
- How is the progress and impact of our risk mitigation strategy measured and rewarded?

Define and adopt a risk management plan

Having assessed the risk of association of the enterprise's operations and supply chains with deforestation, the next stage is to cease causing harm or mitigate the risk and prevent future risks. All the related measures and processes should be defined in a risk management plan; separate plans may be necessary for different commodities or different sourcing areas.

Box 4 includes potential risk prevention measures which can help manage the risk of deforestation in the enterprise's operations and supply chains, and companies should refer to the OECD-FAO Guidance for more detail.

Box 4. Risk prevention measures

Risk prevention measures available to enterprises will depend on their position in the supply chain and their capacity; some of the measures below are applicable mainly to producers and some to enterprises sourcing directly from producers.

Measures to improve transparency and the level of information available include:

- Requiring more than one source of information on products (see Box 2 and Box 3)
- Undertaking independent surveys or audits of source areas and/or business partners
- Commissioning an independent audit of the enterprise's due diligence system
- Conducting audits of suppliers' due diligence systems, focusing on their systems to identify and address deforestation risks
- Reinforcing traceability or chain of custody systems and engaging with control points in key commodity chains
- Empowering local community members to act as forest monitors
- Using certification schemes (with careful evaluation of actual consideration of forest protection in the selected scheme)
- Potentially sharing information on risks and risk mitigation strategies with other companies through industry associations or public-private platforms; this is likely to be of particular value to SMEs
- Communicating regularly with OECD National Contact Points for RBC.

Measures to engage with suppliers include improving awareness, and offering assistance and incentives, especially for smallholder farmers, particularly those affected by any deforestation cut-off date the company is implementing or that is required by regulation.

- Providing financial support, longer-term contracts
- Responsible purchasing practices
- Better payment terms
- Access to forestry experts or due diligence experts
- Capacity-building and training. Sometimes such support may be better delivered by local NGOs or other organisations.

The risk management plan should specify:

- Timelines for developing each of the measures and processes to be adopted.
- Resources to be mobilised, including budgetary (for travels, data procurement, traceability system, etc.) and human (forestry experts and legal experts, for example).
- Roles and responsibilities within the enterprise for implementing the management measures (e.g. who on the Board could be a resource for responding to deforestation issues, participation of teams on procurement, regional heads of areas that include red flag locations, etc.).
- Procedures for consulting with affected stakeholders, including business partners, governments and affected communities and civil society in the countries of origin, to clarify concerns and agree on the strategy for mitigating risks and opportunities to feed into the deforestation policies and strategy of the company.

- Monitoring systems for assessing the implementation of the plan and its impacts (including, for example, access to publicly available data/satellite monitoring of forests, indicators/ data points to collect from suppliers), and reporting processes to designated senior management.
- Procedures to follow in cases of non-compliance by suppliers and follow-up plans such as awareness-raising, training on detection and reporting on deforestation.
- Procedures to support producers, notably smallholders, with attention to gender and social inclusion.

Respond to adverse impacts – implement the risk management plan, monitor and track performance

How an enterprise responds to adverse impacts will depend on the extent to which it causes, contributes to or is directly linked to them. In the specific case of deforestation, it means the following:

If the enterprise has caused deforestation, it should cease the activities that cause deforestation, prevent further potential adverse impacts and provide remedy for actual adverse impacts it caused. This may entail suspending operations temporarily while undertaking measurable efforts to prevent any future adverse impacts, or suspending operations permanently if these impacts cannot be mitigated.

Where assessment and mapping exercises find that the enterprise has contributed to deforestation, it should cease and provide remedy with respect to its contribution and use its leverage over its business partners to mitigate any remaining adverse impacts. This may entail suspending operations temporarily. The enterprise should also take preventive measures to ensure that these adverse impacts do not recur.

If the enterprise has not contributed to deforestation, but an observed impact has nevertheless been directly linked to its operations, products or services through a business relationship, it should use its leverage to mitigate or prevent the adverse impact, for instance requesting changes in the investment plan to ensure that forests are preserved and sustainable production practices are encouraged. This may lead to disengaging from a business partner after failed attempts at mitigating risks or when risk mitigation is deemed to be not feasible or unacceptable.

Where it is possible, continue the relationship and demonstrate a realistic prospect of, or actual improvement over time, such an approach will often be preferable to disengagement. The enterprise should also take into account potential social, environmental and economic adverse impacts related to the decision to disengage. When deciding to disengage, enterprises should do so responsibly including by seeking meaningful consultation with relevant stakeholders in a timely manner and where possible, by taking reasonable and appropriate measures to prevent or mitigate adverse impacts related to their disengagement.

Factors that are relevant to determining the appropriate response include: the severity of the adverse impact, the enterprise's ability to influence and/or build leverage over the business partner or other relevant actors (e.g. government), and how critical the business partner is to the enterprise (if it is critical, the enterprise should increase its efforts to change the partner's behaviour; where it is less crucial, disengagement may be a better option). A wide range of measures are available to enterprises to mitigate the adverse impacts of deforestation, depending on the enterprise's position in the supply chain. Where feasible they should encompass measures that achieve positive impacts on forests and the workers and communities who depend on them – what are sometimes termed “forest-positive” actions.

Responding to deforestation impacts and promoting forest-positive outcomes

Actions to protect and restore forests include:

- Identifying areas of future risk to forests in or near the enterprise's supply chains and engaging suppliers to take preventive action. This could include, for example, engaging with farmers to understand why deforestation may occur and what measures could be adopted to ensure it does not.
- Investing in programmes that promote forest conservation and sustainable agricultural production practices, such as agroforestry and intercropping.
- Supporting forest ecosystem restoration in areas of degraded forest, and the restoration and sustainable use of fallow or degraded land.
- Choosing to buy from suppliers who are implementing forest-positive practices themselves, including conserving and restoring forests while promoting sustainable livelihoods.
- Rewarding such suppliers by purchasing their goods at a premium, buying larger quantities or agreeing longer-term contracts.

Working with farmers, farmer cooperatives and local communities, who are central to managing forest conservation and restoration, could include:

- Making and communicating explicit commitments to respecting the rights of Indigenous Peoples and local communities (See Annex B of the OECD-FAO Guidance: Engagement with Indigenous Peoples. (OECD-FAO, 2016^[1]))
- Gathering information on land tenure (both statutory and customary rights) within the enterprise's operations and supply chains and those of its suppliers, and adopting measures to ensure they are not adversely affected by the enterprise's operations.
- Supporting innovation and capacity-building to improve agricultural productivity and diversified production systems including agroforestry and farm management systems in order to help reduce poverty and meet community food security needs without expansion into forests.
- Providing support to farmers, particularly smallholders, in adopting agricultural innovation and sustainable, forest-positive techniques and technologies, so that incomes are strengthened, farms are more productive and resilient and forests are kept standing.
- Paying farmers and farm organisations (such as co-operatives and women's producer organisations) fair prices for their products, with the aim of contributing to achieving living incomes – potentially linked to performance in reducing deforestation and forest degradation, adopting sustainable production techniques, and engaging in forest ecosystem restoration.
- Supporting smallholder livelihood initiatives that deliver forest conservation and farmer resilience and inclusion, including through long-term contracts, responsible purchasing practices, strengthening organisational structures such as cooperatives, implementing traceability systems and financial support.
- Encouraging and supporting local initiatives, involving farmers, local communities, Indigenous Peoples, women and other marginalised groups, local industry and government, to develop and implement local solutions.
- Collaborating with local government to jointly foster enabling framework conditions for deforestation-free production, such as clarifying and recognising land rights and providing targeted support by agricultural extension officers.
- Participating in or developing systems of payments for ecosystem services.

Supporting landscape and jurisdictional initiatives to help address the root causes of deforestation in particular regions could include:

- Contributing to the development of forest-positive strategies across an entire landscape or jurisdiction – measures include improving land use planning, identifying no-go areas, strengthening forest monitoring by public authorities and/or local communities, helping companies avoid deforestation and manage conservation areas.
- Helping to promote collaboration amongst the private sector within the landscape or jurisdiction, and with governments, communities, Indigenous Peoples and sources of financial support and investment.
- Supporting local forest monitors and environmental defenders.
- Supporting initiatives and stakeholders engaged in improving law enforcement.
- Supporting and lobbying for improvements in the wider enabling environment, including, for example, greater supply chain transparency, traceability and monitoring systems; improvements in governance and law enforcement, particularly in human rights and land rights; and the wider provision of agricultural support, infrastructure and public services, with appropriate support from donors and national and local public entities.
- Participating in the development of sustainable finance mechanisms for conservation and restoration initiatives that include social and environmental co-benefits, including improved biodiversity and more resilient livelihoods and respect for human rights.

Promoting and supporting international initiatives to reduce deforestation and scale up forest-positive action could include:

- Encouraging and participating in the development of commodity roundtables, certification schemes and other multi-stakeholder initiatives.
- Participating in appropriate industry initiatives, business associations and coalitions.
- Supporting the development of reliable and accessible sources of data on deforestation rates and drivers, and examples of best forest-positive practice.
- Contributing to the dissemination of information and knowledge on international initiatives, regulations and schemes, notably on processes linked to the REDD+ framework.

Suggestions for SMEs

All SMEs:

- Designate someone in your company to lead and decide who should be involved in designing and implementing your strategy; ensure they have the sufficient resources, knowledge and support.
- Tap into industry initiatives and association networks to learn how peers and other companies are addressing problems and if they have similar approaches that can guide your efforts.
- Include deforestation targets and objectives as part of performance reviews and incentives for staff, to drive change.
- Ensure that your identified risks feature in sales terms, procurement and contracting practices and in clauses in your agreements.
- Identify the resources needed to implement the activities under your risk management plan.
- Share your action plan with all your suppliers and ask your suppliers also to share it with partners in the supply chain with whom you may not have direct contact.
- Explain to suppliers that may be identified in your prioritisation efforts that you will need to enhance co-operation in reducing deforestation risk.

In addition, upstream SMEs can:

- Consider including in your strategy actions to develop co-operation with producers, smallholder farmers, Indigenous Peoples, local communities or other stakeholders in the supply chain, and communicate that strategy downstream.
- Include requests on due diligence that customers ask for, to help shape your strategy.

Step 4: Verify due diligence of deforestation

Step 4 of the OECD-FAO Guidance is about establishing systems to track and monitor due diligence actions to make sure they are effective.

Strategic questions for enterprises

- Do we conduct due diligence assessments at key points in the supply chain (i.e. at control or choke points)?
- Are our due diligence assessments internally led or carried out by external third-party assessors, or both? Have we used external audits for any gaps to ensure that the assessment is comprehensive and considers different ways that deforestation occurs (e.g. through outsourcing to different suppliers, etc.)? If so, have we checked the independence and quality of those audits and the information flowing from them, and layered on our own risk-based monitoring and verification activities?
- What role can technology play in assessments of our due diligence actions on deforestation?
- Are there opportunities to partner with others in sharing data and reducing costs?
- How have we responded to third parties' complaints on deforestation risks?
- If we use third party commodity or product certification schemes, do we know if these schemes are aligned to the OECD-FAO Guidance and the risk-based due diligence framework? If not, what steps can we take to make sure they are more aligned?
- How do we monitor suppliers with whom we do not have a contract, in order to effect change?

Track the implementation and effectiveness of due diligence activities

Enterprises should take steps to verify that their due diligence practices are effective, i.e. that risks have been adequately identified and prevented and adverse impacts have been mitigated. This involves both *monitoring* of impacts to assess and document the extent to which actions, progress, performance and compliance are being carried out or achieved; and *verification* of compliance, performance, and/or actions relative to a stated commitment, standard or target.

This process should be proportionate to the risk; take into account the capacities of various enterprises, as such processes can be costly; and where necessary, generate recommendations to improve due diligence practices.

Monitoring of the effectiveness of the enterprise's due diligence process can draw on the types of information listed in Chapter 5 on types and potential sources of information on commodities and products; and on sources of information on deforestation. This monitoring should consider the following:

- Levels of deforestation, and levels of the risk of deforestation, in the areas from which the enterprise is sourcing commodities and products change over time and need to be continually monitored. The elements listed in Box 2 (on types and potential sources of information on commodities and products) will help to deliver information on the products and commodities in the enterprise's operations and supply chains.
- The sources listed in Box 3 can help to identify deforestation in the supply area during the monitored period: any change in tree cover in this area constitutes an alert for which the level of the enterprise's responsibility must be assessed.

Verification of the effects of the enterprise's due diligence procedure include reviews of documents and internal control mechanisms, verification via satellite data, third-party audits,⁵ on-site investigations, and consultations with local communities, civil society and government authorities. The frequency and intensity of verification efforts should themselves be risk-based, in line with Step 2 of the OECD-FAO Guidance (identifying risks).

The results of monitoring and verification efforts should be fed back into the design and functioning of the due diligence system, as due diligence is a dynamic process. Where the risk has been mitigated or prevented, the enterprise should conduct ongoing due diligence to ensure that the risk does not recur, or that new risks do not appear.

The enterprise should also monitor its own internal control mechanisms and ensure they are robust and working as intended. Consultation and engagement with external stakeholders such as Indigenous Peoples, local communities, civil society and international organisations can help to identify problems and is crucial to the impartial and efficient verification of due diligence processes.

Suggestions for SMEs

All SMEs:

- Identify local NGOs and communities or international organisations with knowledge of the agricultural sourcing communities in your focus commodity sectors; speak to them regularly to triangulate information you receive from suppliers.
- Understand from your customers or existing regulations the type and frequency of data needed. Seek ways in which data can be pooled across customers, or how technology can be used to increase efficiency and reduce costs.
- Consult existing platforms that can help you to identify deforestation alerts in your supply areas.
- Consider working with partners and suppliers to introduce joint complaints or whistleblowing systems. The OECD National Contact Points for RBC can also be a resource in this regard.
- Consider using tools and indicators from industry initiatives, certification schemes, or deforestation platforms that you may be part of, to support your verification of due diligence.
- Work together with peer companies and industry groups to increase your leverage when deforestation risks persist within your supply chains.
- Team up with other suppliers, business associations and NGOs, if your leverage over a business partner is insufficient to encourage change.

In addition, upstream SMEs can:

- Ensure that your customers know how you verify and collect information, including the type of data collected, frequency of collection and who you work with in obtaining that data.
- Be transparent in communicating what information you do not have, and why.
- Discuss with upstream buyers how they may support your data collection activities and use their leverage and capacity, which may be greater than your own.
- Identify and support existing forest monitoring systems for your areas of supply whether based on community monitoring or remote sensing surveys.

Step 5: Report on due diligence to address deforestation

Step 5 of the OECD-FAO Guidance is about reporting publicly on company efforts to implement due diligence.

Strategic questions for enterprises

- Do we report on deforestation risks identified in our supply chain and specific mitigation we have undertaken?
- Do we provide an annual update on our deforestation commitments and how we are progressing (or not) against them?
- Should our reporting be carried out through one document or through several discrete issue reports linked to our company deforestation commitments, or the commodities we handle, or through a chapter in our company report on sustainability?
- Have we incorporated the reporting recommendations according to the OECD-FAO Guidance?
- Do we share these reports with external stakeholders, and ask for candid feedback on what is good and what can be improved?
- How do our reports on due diligence contribute to improving our overall learning and improvement of due diligence to address deforestation?
- Do we publicly disclose our efforts on the different due diligence steps, including co-operation with suppliers to mitigate deforestation risks from taking place?

Public Reporting

It is important that enterprises with exposure to actual or potential deforestation risks publicly and regularly report on their forest-related due diligence policies and practices (where appropriate as part of a wider framework, such as deforestation- and conversion-free objectives), with due regard taken to business confidentiality and other competitive concerns. This may include both qualitative information on system design and quantitative reporting on performance. This can provide affected stakeholders, business partners and investors with clear, accurate and timely information on actual and potential adverse impacts identified through ongoing impact assessments, and on the steps and measures taken to mitigate or prevent them.

Information that could feature in such reports includes:

- The enterprise's commitments with regard to tackling deforestation and forest degradation, including not only the objectives (no deforestation or reduction of risk by a defined percentage, etc.) but also the enterprise's definition of forests, deforestation and forest degradation, cut-off dates, scope in terms of commodities and geographies, and so on.
- The percentage of the enterprise's production volume (both from land managed by the enterprise and sourced) that is determined to be deforestation-free or the percentage for which this not known.
- Summaries of the data and information collected, outlining the enterprise's exposure to risks, progress made against each target and commitment (preferably in a time series, showing progress year by year) and any adverse impacts it may have caused or contributed to.
- The enterprise's management systems, including its due diligence policy, specifying the management structure responsible for the company's due diligence and who in the company is directly responsible.
- The risk analysis and mitigation systems put in place by the enterprise to address deforestation, including how they function and the control systems in place, including certification, traceability or chain of custody.

- How the information collected has been used to strengthen responsible sourcing and management, mitigate against risks, provide remediation and meet the enterprise's commitments.
- Co-operation with stakeholders and methods for disclosing information to all clients and suppliers, upstream and downstream, including in the context of identifying or managing the drivers of deforestation
- Information on compliance with any national legislative requirements and international standards on due diligence and deforestation.

Reporting on the enterprise's due diligence systems and performance can take place in various contexts and formats, including the company's annual reports, sustainability reports or specific reports on the enterprise's impacts on forests. Reports can be made publicly available through the enterprise's website, social media and meetings with stakeholders, including upstream and downstream partners. Communication needs to be appropriate to the impacts and audience in terms of its form (including translation into appropriate languages), frequency, accessibility, and the adequacy of information provided. Information collected can also be communicated to reporting frameworks, such as CDP Forests' disclosure system, the Global Reporting Initiative (GRI) reporting standards, the supply-change.org website or national or international trade associations and groupings.

Reports should adopt clear and constant metrics, to facilitate monitoring and analysis at supply chain or country level, for instance. Enterprises should report on the outcomes of processes in all the due diligence steps, in line with the OECD-FAO Guidance; doing so could also contribute to alignment with reporting standards such as those of the GRI. For instance, with respect to step 1, enterprises could describe their policy commitments for RBC, provide links to these commitments (if publicly available, or, if not, explain the reason for this), report the level at which each of the policy commitments was approved within the organisation, including whether this is the most senior level, report the extent to which the policy commitments apply to the enterprise's activities and to its business relationships, and describe how the policy commitments are communicated to workers, business partners, and other relevant parties. Moreover, enterprises should describe how they embed each of their policy commitments for RBC throughout their activities and business relationships.

Suggestions for SMEs

All SMEs:

- Decide how and when you want to communicate with your customers and business partners in the most resource efficient way; this can take place via email and supported by social media.
- Include relevant information on deforestation risks you identified and mitigation efforts in your annual reports, if you produce them.
- If your business participates in sub-national, national or international certification or forest protection initiatives, communicate your efforts to mitigate deforestation risks according to the OECD-FAO Guidance and this Handbook.

In addition, upstream SMEs can:

Consider making use of shorter regular updates posted on your premises, website or via social media.

Remediation for adverse impacts

This chapter of the Handbook addresses what actions an enterprise can take when it has failed to prevent or mitigate deforestation, including remediation.

While the prevention of deforestation should take priority, there may be cases where an enterprise, though its exercise of due diligence or other means, has identified actual deforestation but has failed to prevent or mitigate it entirely. In such a case the enterprise should identify why, and take remedial action in relation to any adverse impacts which have resulted.

The enterprise should identify why its due diligence procedures failed to prevent or mitigate the adverse impacts and take corrective action to ensure that the problem does not recur; engagement with local stakeholders, including local communities and Indigenous Peoples, civil society and government, will be essential in establishing suitable mechanisms.

When an enterprise identifies that it has caused or contributed to actual adverse impacts, a number of measures can be taken:

- Where possible, the enterprise should seek to restore the *affected person or persons* to the situation they would be in had the adverse impact not occurred. This may include, where possible, the restitution of land to dispossessed Indigenous Peoples or local communities.
- Where possible, the enterprise should seek to restore *the affected environment* to the state it would be in had the adverse impact not occurred, e.g. by restoring degraded forests or deforested land, and ensuring long-term support for the restored area.
- Where this is not possible (in many cases of deforestation it may not be), the enterprise can: (1) provide appropriate levels of compensation in a form mutually agreed by affected communities (this may not always be monetary; a community could identify support for education or health services, for example, as more appropriate); and/or (2) provide appropriate compensation for environmental impacts, in particular greenhouse gas emissions and biodiversity loss.
- Where appropriate, the enterprise can provide for or cooperate with legitimate remediation mechanisms through which impacted stakeholders and rights-holders can raise complaints and seek to have them addressed with the enterprise (see also section on grievance mechanisms in Step 1 of the OECD-FAO Guidance).

Glossary

Definitions marked with an asterisk (*) are the standard definitions established by the FAO (2020^[21]); others are not internationally agreed. Although they also feature in many international and national frameworks and legislation, it is important to note that definitions of some of these terms, such as “forest”, are often different in national legislation and in voluntary standards. Companies can adopt different definitions but should ensure they are clearly stated in their corporate strategy on deforestation.

Afforestation: Establishment of forest through planting and/or deliberate seeding on land that, until then, was under a different land use, implies a transformation of land use from non-forest to forest.

Control points or choke points: Enterprises that have greater visibility and/or leverage over their own suppliers and over business relationships further up the supply chain than enterprises closer towards consumers or end-users. They can have the following characteristics:

- Point of transformation. They are located at key points of transformation in the supply chain where traceability or chain of custody information may be aggregated or lost.
- Low number. There are relatively few enterprises at this specific point in the supply chain that process or handle a majority of inputs that they pass further down or up into the chain.
- High Leverage. The greatest point of leverage over suppliers and actors further upstream in the supply chain.
- Audits occur here. Points where schemes and audit programmes already exist to leverage these systems and avoid duplication.

Conversion: Change of a forest or other natural ecosystem to another land use or profound change in a natural ecosystem’s species composition, structure, or function.

Cut-off date: The date in legislation or standard after which deforestation on the plots or properties of origin is not permitted if the commodities or products are to be considered compliant with the legislation or standard or policy.

Deforestation*: The conversion of forest to other land use independently, whether human-induced or not.

Deforestation-free: There is no standard definition for this term, but it is generally taken to mean commodities or products or supply chains that do not cause or contribute to deforestation or forest degradation in their country of origin.

Forest*: Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

Forest degradation: There is no FAO or other standard definition for this term; the FAO encourages countries to define it themselves. The definition included in the Accountability Framework, which applies to other natural ecosystems as well as forests, is: “Changes within a natural ecosystem that significantly and negatively affect its species composition, structure, and/or function and reduce the ecosystem’s

capacity to supply products, support biodiversity, and/or deliver ecosystem services.” (Accountability Framework, 2020^[4])

Forest-positive: There is no single definition for this term, but it is generally taken to mean moving beyond simply managing deforestation risks in an enterprise’s supply chain to achieving positive impacts on forests and the workers and communities who depend on them.

High carbon stock approach: methodology for distinguishing forest areas that should be protected – those that are important to local communities or have high carbon or biodiversity values – from degraded lands that may be developed, through an integrated land use planning approach.

High conservation value: biological, ecological, social, or cultural value of outstanding significance or critical importance.

Indigenous Peoples*: People regarded as indigenous on account of their descent from the population which inhabited the country, or a geographical region to which the country belongs, at a time of conquest or colonisation or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions.

Landscape and Jurisdictional Approaches: IUCN defines a Landscape approach as one where the interests of the different stakeholders in a landscape are assessed in an integral manner and aligned through dialogue. The landscape approach works on sustainable landscape management while considering the full socio-economic context in an area (IUCN, 2023^[22]).

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 are present.

Zero-deforestation: Commodity production, sourcing, or financial investments that do not cause or contribute to deforestation. This definition refers to *gross deforestation*, i.e. any conversion of forests to other land use without regard to compensatory gains in forest cover.

Annex A. Resources

Sources of data on forests and deforestation

Numerous datasets, processing tools, and platforms exist to help gain information on forest area, forest type, deforestation, and reforestation. Datasets refer to either the primary data or the processed data used to produce information. All datasets listed here are freely available to download (e.g. from a website) or view (e.g. in a web data portal). Once downloaded, datasets can be used in more sophisticated analyses using geospatial data processing software.

Processing tools are individual algorithms or software that can be used to add value to data or information to produce higher-order products and analyses. Most tools are freely available, though some require specific licensing for commercial use. Processing platforms are web-based or desktop collections of tools capable of providing end-to-end support for data access and processing. Platforms, as well, can be free to use or require licensing for commercial applications. Collectively, these resources can be very valuable in tracking supply chain impacts at local to global scales.

When seeking and using data on forests, it is important to remember some key points about the information available. Tree cover and forest are different. Tree cover describes a biophysical characteristic of the Earth's surface (e.g. there are trees). Forest, however, is a land use and may, or may not, have tree cover due to management practices (e.g. temporary tree removal from harvest as part of normal management cycles or due to fire). Deforestation, then, refers to a loss of tree cover and a concurrent change in land use from forest to non-forest. Forest degradation refers to a loss of tree cover but no change in land use.

Clearly understanding these terms will help to prioritise datasets based on the information sought.

When looking for information on deforestation in a specific country, a company may wish to reach out to the national focal points for REDD+ or National Forest Monitoring Systems for available public data.

The following tables are not comprehensive and only intended to provide a robust snapshot of available tools and platforms to access forest change related information as of June 2022. Most of the information is synthesised and updated regularly in several lists, such as REDD Compass (<https://www.reddcompass.org/>) or Open MRV (<https://openmrv.org>). The reader is invited to consult them for more in-depth understanding of the data and tools.

Table A A.1. Primary datasets

Primary datasets	Info Type	Spatial Resolution	Open Source	Producer	Ease of Use	Update	First data available	Geographic Scale	URL
MODIS mission	Optical Imagery	250-1 000m	Yes	NASA	Moderate	Day	2000	Global	https://modis.gsfc.nasa.gov/
Landsat mission	Optical Imagery	30m	Yes	NASA	Moderate	16-day	1972	Global	https://landsat.gsfc.nasa.gov/
Copernicus mission	Optical and Radar Imagery	10-20m	Yes	ESA	Moderate	5-day	2015	Global	https://www.esa.int/Applications/Observing_the_Earth/Copernicus
Planet NICFI	Optical Imagery	3-5m	Made available through the NICFI programme until at least 2024	Planet	Moderate	Daily	2015	Tropical	https://www.planet.com/nicfi/

Table A A.2. Processed datasets

Processed datasets	Info Type	Spatial Resolution	Open Source	Producer	Ease of Use	Update	First data available	Geographic Scale	URL
UMD GLAD	Imagery, tree cover, change, alerts, fire	30m	Yes	University of Maryland, United States of America	Easy	Month	2000	Global	https://glad.umd.edu/lpdaac.usgs.gov/products/gfccc30fccv001/ https://glad.umd.edu/dataset/gedj https://firms.modaps.eosdis.nasa.gov/map/ https://forobs.jrc.ec.europa.eu/TMF/explorer.php
JRC TMF	Forest cover change incl. degradation Alerts	10-30m	Yes	Joint Research Centre, EU	Easy	Annual	1992	Tropical	https://glad.umd.edu/dataset/glad-forest-alerts
GLAD alerts (L&S)	Alerts	30m	Yes	University of Maryland, United States of America	Moderate	Month	2017	Global (L), Latin America (S)	
RADD alerts (S)	Alerts	20m	Yes	Wageningen University, the	Moderate	Month	2020	Primary humid tropical forest	http://radd-alert.wur.nl

Processed datasets	Info Type	Spatial Resolution	Open Source	Producer	Ease of Use	Update	First data available	Geographic Scale	URL
Dynamic World	LCLU	20m	Yes	Netherlands Google, World Resources Institute	Moderate	Day	2015	Global	https://developers.google.com/earth-engine/datasets/catalog/GOOGLE_DYNAMICWORLD_V1
ESA CCI	LCLU	300m	Yes	ESA	Moderate	Annual	1992	Global	http://maps.elie.ucl.ac.be/CCI/viewer/index.php
ESA Worldcover	LCLU	10m	Yes	ESA	Easy	Annual	2020	Global	https://worldcover2020.esa.int/viewer
JAXA Forest / Non-forest	Tree cover	25-1 000m	Yes	JAXA	Easy	Annual	2007	Global	https://earth.jaxa.jp/en/data/2555/index.html
JRC TMF	Forest cover change incl. degradation	10-30m	Yes	Joint Research Centre, EU	Easy	Annual	1992	Tropical	https://forobs.jrc.ec.europa.eu/TMF/explorer.php
Crowther Lab layers	Forest restoration potential, biomass, tree density	30m-300m	Yes	ETH Zurich	Easy	-	-	Global	https://crowtherlab.com/maps/#/

Table A A.3. Data access platforms / tools

Data access platforms / tools		Description	URL
Global Forest Watch		Global Forest Watch (GFW 2.0) is an online platform led by WRI that provides data and tools for monitoring forests. GFW 2.0 provides a dashboard with precalculated zonal statistics on various tree cover change and forest extent products, essentially at national and subnational levels. It also allows users to visualise the GLAD datasets in a geoportal and refine those calculations for user-defined zones.	www.globiaforewatch.org
Terra-i		Terra-i detects land-cover changes resulting from human activities in near real-time, producing updates every 16 days. Currently it works for the whole of Latin America and the tropics. It is led by CIAT.	www.terra-i.org
FAO Forest Assessment series	Resources	FAO Global Forest Resources Assessment (FRA) provides essential information for understanding the extent of forest resources, their condition, management and uses, at national level.	https://fra-data.fao.org/
OpenForis EarthMap		EarthMap is a tool for quick historical environmental and climate analysis based on Google Earth Engine and developed within FAO's Open Foris Initiative.	https://earthmap.org
MapBiomas		Gathering and releasing LULUCF information in the Pan-Amazon; Brazilian Cerrado, Pampas and Pantanal; El Chaco region; and Indonesian tropical forests.	https://mapbiomas.org

Table A A.4. Data processing platforms / tools

Data processing platforms / tools	Description	URL
Google Earth Engine	Google Earth Engine is a geospatial processing service, powered by Google Cloud Platform. The purpose of Earth Engine is to: provide an interactive platform for geospatial algorithm development at scale; enable high-impact, data-driven science; and make substantive progress on global challenges that involve large geospatial datasets.	https://code.earthengine.google.com/
OpenForis SEPAL	SEPAL is a cloud computing platform that allows users to query and process satellite data quickly and efficiently, tailor their products for local needs, and produce sophisticated and relevant geospatial analyses quickly. Harnessing cloud-based supercomputers and modern geospatial data infrastructures (e.g. Google Earth Engine), SEPAL enables access and processing of a wide range of satellite data.	https://sepal.io
OpenForis Collect Earth	Collect Earth is a tool that enables data collection through Google Earth. In conjunction with Google Earth, Bing Maps and Google Earth Engine, users can analyse high and very high resolution satellite imagery for a wide variety of purposes.	https://openforis.org/tools/collect-earth/
OpenForis Collect Earth Online	Collect Earth Online (CEO) is the next generation of web-based, crowd-sourcing technology for Earth Science analyses. It allows users to collect reference data using high-resolution satellite images and big-data analysis through Google Earth Engine. Multiple users can simultaneously collect information.	https://collect.earth/
Open Data Cubes	The Open Data Cube (ODC) is an Open Source Geospatial Data Management and Analysis Software project that helps harness the power of satellite data. At its core, the ODC is a set of Python libraries and PostgreSQL database that helps users work with geospatial raster data. The ODC provides an open and freely accessible exploitation architecture and seeks to foster a community to develop, sustain, and grow the technology and the breadth and depth of its applications for societal benefit.	https://www.opendatacube.org/
Digital Earth Africa	The DEA platform and services enable African Governments, industry and decision makers to track changes across the continent in unprecedented detail. This provides valuable insights for better decision-making across many areas, including flooding, drought, soil and coastal erosion, agriculture, forest cover, land use and land cover change, water availability and quality, and changes to human settlements.	https://www.digitalearthforafrica.org/
EU Forestry Thematic Exploitation Platform	The Forestry Thematic Exploitation Platform (Forestry TEP) enables commercial, governmental and research users in the forestry sector globally to efficiently access satellite data based processing services and tools for generating value-added forest information products. Via the platform, the users can also create and share their own processing services, tools and generated products.	https://f-tep.com/
Proposed EU Observatory	Not yet in operation, the EU Observatory on deforestation and forest degradation is aimed to provide open, transparent and free information related to forest loss, degradation and EU trade in relevant commodities and products.	

Table A A.5. Supply chain mapping tools

Supply chain mapping tools	Description	URL
SPOTT	SPOTT is a free, online platform assessing commodity producers, processors and traders on their public disclosure regarding their organisation, policies, and practices related to environmental, social and governance (ESG) issues. It provides a dashboard to download assessment data, analyse trends, and access further resources.	https://www.spott.org

Supply chain mapping tools	Description	URL
TRASE	Trase is a supply chain mapping tool at scale with three main characteristics: - It systematically links individual supply chain actors to specific, subnational production regions, and the sustainability risks and investment opportunities associated with those regions; - It identifies the individual companies that export, ship and import a given traded commodity; and - It covers all of the exports of a given commodity from a given country of production.	https://supplychains.trase.earth
Open Land Contracts	OpenLandContracts is a global repository of publicly available contracts and related documents for agriculture, forestry, and other land-based investment projects. Users can access original documents in PDF form; the full text of each contract; plain language summaries of contracts' key social, human rights, environmental, fiscal, and operational provisions; and tools to search and compare contracts.	https://openlandcontracts.org

Voluntary sustainability standards and certification systems

Voluntary sustainability standards⁶ and certification systems⁷ based on them have an important potential role to play in due diligence frameworks covering deforestation, alongside other tools. They often contain very detailed sets of environmental, social and economic criteria which products certified to their standard must meet, together with chain of custody, verification, assurance and monitoring systems for the certification process. Many standard systems have strong participatory and inclusive elements, either because they are organised as multi-stakeholder commodity roundtables or because their standard is regularly reviewed in a participatory process, or both; however, there are significant variations between the different standards and schemes and their governance.

In principle, different types of VSS and certifications can be used as:⁸

- A means of adopting criteria related to the protection of forests and avoiding deforestation after a specific cut-off date for an enterprise's forest policy.
- A source of information in the risk assessment step of a due diligence system.
- A tool to be used in the risk mitigation step of a due diligence system.
- A framework for engaging with and supporting farmers and other actors in the supply chain.

Some VSS and certification systems have developed simpler systems for the verification of a more limited range of criteria when certified materials are mixed with non-certified materials that, for example, are required not to have been harvested illegally. There are also some simpler legality verification schemes, which verify whether products have been produced in accordance with national laws in their countries of origin; these include laws related to deforestation.

VSS and Certification schemes can provide valuable tools to help enterprises implement the steps described in this Handbook, and, importantly, they often also incorporate a wider range of criteria than just forest conservation and land use change. However, companies retain ultimate responsibility for their due diligence and have a responsibility under each Step of the due diligence process. A certification, however strong or comprehensive, cannot replace this responsibility. Instead, companies that use certifications should check and build on the information they receive through their own risk-based checks. Certifications may also not satisfy all the requirements of national due diligence legislation. They should be viewed as an important potential component of, and information source for, the enterprise's due diligence policy, not a substitute for it.

The table below lists some of the main voluntary sustainability standards and certification schemes for commodities mentioned in this Handbook. Only some of those with international coverage are listed; there are also many national and regional schemes, particularly, though not only, for timber and wood products. The table also does not include commodity round tables that have not yet developed certification schemes; examples include the Global Roundtable for Sustainable Beef and the Global Platform for Sustainable Natural Rubber.

There are also government-supported (and sometimes mandated) standards, listed in Table A A.7.

Table A A.6. Voluntary sustainability standards and certification schemes

Standard / certification scheme	Commodities covered	URL
Bonsucro	Sugarcane	https://bonsucro.com
Fairtrade	Wide range of products, including cocoa, coffee, sugar, tea	https://www.fairtrade.net
4C Association (Common Code for the Coffee Community)	Coffee	https://www.4c-services.org

Standard / certification scheme	Commodities covered	URL
International Sustainability and Carbon Certification (ISCC)	Agricultural and forestry biomass, biogenic wastes and residues; mainly used for biofuel feedstocks such as vegetable oils	https://www.iscc-system.org
Forest Stewardship Council (FSC)	Wood products	https://fsc.org
Programme for the Endorsement of Forest Certification (PEFC) (recognises national forest certification systems aligned with PEFC standards)	Wood products	https://pefc.org
ProTerra	Any agricultural commodity; mainly used for soy	https://www.proterrafoundation.org
Rainforest Alliance	Wide range of products, including cocoa, coffee, palm oil, tea	https://www.rainforest-alliance.org
Round Table on Responsible Soy (RTRS)	Corn, soy	https://responsiblesoy.org
Roundtable on Sustainable Biomaterials (RSB)	Wide range of bio-based feedstock and biomass-derived material; mainly used for biofuel feedstocks	https://rsb.org
Roundtable on Sustainable Palm Oil (RSPO)	Palm oil	https://rspo.org
Sustainable Biomass Programme (SBP)	Woody biomass used in large-scale industrial energy production	https://sbp-cert.org

Table A A.7. National sustainability standards and certification schemes

Standard / certification scheme	Commodities covered	URL
African Standard for Sustainable Cocoa	Cocoa	Not available
Indonesian Sustainable Palm Oil (ISPO)	Palm oil	Not available
Malaysian Sustainable Palm Oil	Palm oil	https://www.mpoc.org.my/about-mspo

Other relevant resources

Table A A.8. Other relevant resources

Name	Description	URL
Accountability Framework	Set of norms, definitions, and guidance to achieve ethical supply chains in agriculture and forestry, aiming to bring clarity and consistency in how companies set commitments, take action, and monitor progress toward achieving supply chains free from deforestation, conversion, and human rights violations. Includes protocols and guidelines for many of the steps discussed in this Handbook.	https://accountability-framework.org
CDP Forests	Framework for companies to measure and manage forest-related risks and opportunities, report on progress, and commit to action for the restoration of forests and ecosystems.	https://www.cdp.net/en/forests
'Collective tenure rights for REDD+ implementation and sustainable development'	Technical paper providing information and case studies on the contribution of collective tenure rights to halting deforestation and climate change mitigation (FAO/UN-REDD Programme).	https://doi.org/10.4060/cb3521en
FAO Free, Prior and Informed Consent (FPIC) Manual	Provides information for practitioners about the right to FPIC and how it can be implemented in six steps.	https://www.fao.org/3/i6190e/i6190e.pdf
Global Reporting Initiative (GRI)	Wide range of sustainability reporting standards.	https://www.globalreporting.org
ISEAL	Network of voluntary sustainability standards, including many of those listed above. Sets Codes of Good Practice and Credibility Principles to help users make informed choices over credible standards.	https://www.isealliance.org
OECD Alignment Assessments process	Seeks to evaluate the alignment of industry or multi-	https://www.oecd.org/corporate/industry-

Name	Description	URL
	stakeholder initiatives, such as certification systems, with the recommendations of OECD Due Diligence Guidance for RBC and the sectoral due diligence guidances.	initiatives-alignment-assessment.htm
OECD e-learning Academy on Responsible Business Conduct	Courses include OECD Due Diligence for Agriculture and Seafood Supply Chains.	https://mneguidelines.oecd.org/oecd-e-learning-academy-on-responsible-business-conduct.htm
Principles for Responsible Investment in Agriculture and Food Systems. Committee on World Food Security.	The Committee on World Food Security (CFS) endorsed the Principles for Responsible Investment in Agriculture and Food Systems on 15 October 2014. They seek to Address the core elements of what makes investment in agriculture and food systems responsible; Identify who the key stakeholders are, and their respective roles and responsibilities with respect to responsible investment in agriculture and food systems; Serve as a framework to guide the actions of all stakeholders engaged in agriculture and food systems by defining Principles which can promote much needed responsible investment, enhance livelihoods, and guard against and mitigate risks to food security and nutrition	https://www.fao.org/3/au866e/au866e.pdf
Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT)	Internationally endorsed Guidelines that serve as a reference and set out principles and internationally accepted standards for the responsible governance of tenure. Accompanied by technical guides, including on respecting free, prior and informed consent, and e-learning courses.	https://www.fao.org/tenure/voluntary-guidelines/en/

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Notes

¹ The OECD FAO Agricultural Outlook 2022-31 illustrates the growing need to promote sustainable agricultural production, including adapting to different region-specific contexts to balance food production with other crops and the conservation of natural resources (OECD-FAO, 2021^[10]).

² In addition to these global initiatives, many regional and national initiatives exist to combat deforestation in agricultural supply chains.

³ See for example the Financial Sector Commitment on Eliminating Commodity-driven Deforestation announced at COP26 (UN, n.d.^[23]) while at COP 27 countries in the Forest and Climate Leaders' Partnership promised to hold each other accountable for a pledge to end deforestation by 2030. <https://www.euronews.com/green/2022/11/07/cop27-more-than-25-countries-band-together-to-keep-deforestation-pledges-made-in-glasgow>

⁴ See the background note on *Translating a risk-based due diligence approach into law* for further information. <http://mneguidelines.oecd.org/translating-a-risk-based-due-diligence-approach-into-law.pdf>

⁵ Where an audit is deemed appropriate, the independence and quality of audits are critical to their effectiveness. Auditors should be independent, competent and accountable. Enterprises may consider using an independent institution responsible for accrediting auditors, verifying audits, publishing audit reports, implementing modules to build capabilities of suppliers to conduct due diligence, and helping to follow up on grievances of interested parties.

⁶ For more information on VSS and their role, see the United Nations Forum on Sustainability Standards (UNFSSS) website: <https://unfss.org/home/about-unfss/>

⁷ Certification is defined by ISEAL as: "The issuance of a third-party statement that fulfilment of specified conformance requirements have been demonstrated (ISEAL, adapted from ISO 17 000)". See https://www.isealalliance.org/sites/default/files/resource/2018-02/ISEAL_Assurance_Code_Version_2.0.pdf

⁸ Please see the Background Note on The role of sustainability initiatives in mandatory Due Diligence, for more information: <https://mneguidelines.oecd.org/the-role-of-sustainability-initiatives-in-mandatory-due-diligence-note-for-policy-makers.pdf>

OECD-FAO Business Handbook on Deforestation and Due Diligence in Agricultural Supply Chains

This handbook was developed by OECD and FAO to help companies embed considerations on deforestation and forest degradation into their corporate due diligence procedures. It is informed by FAO's extensive work and experience on halting deforestation and forest degradation and promoting responsible governance of tenure. The handbook builds on the leading international, government-backed standards on supply chain due diligence and responsible business conduct: the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct and the associated due diligence framework set out in the OECD-FAO Guidance for Responsible Agricultural Supply Chains and the OECD Due Diligence Guidance for Responsible Business Conduct. This handbook demonstrates how the OECD-FAO Guidance can be applied to address deforestation by contextualising existing recommendations and directing users towards helpful sources of due diligence information.

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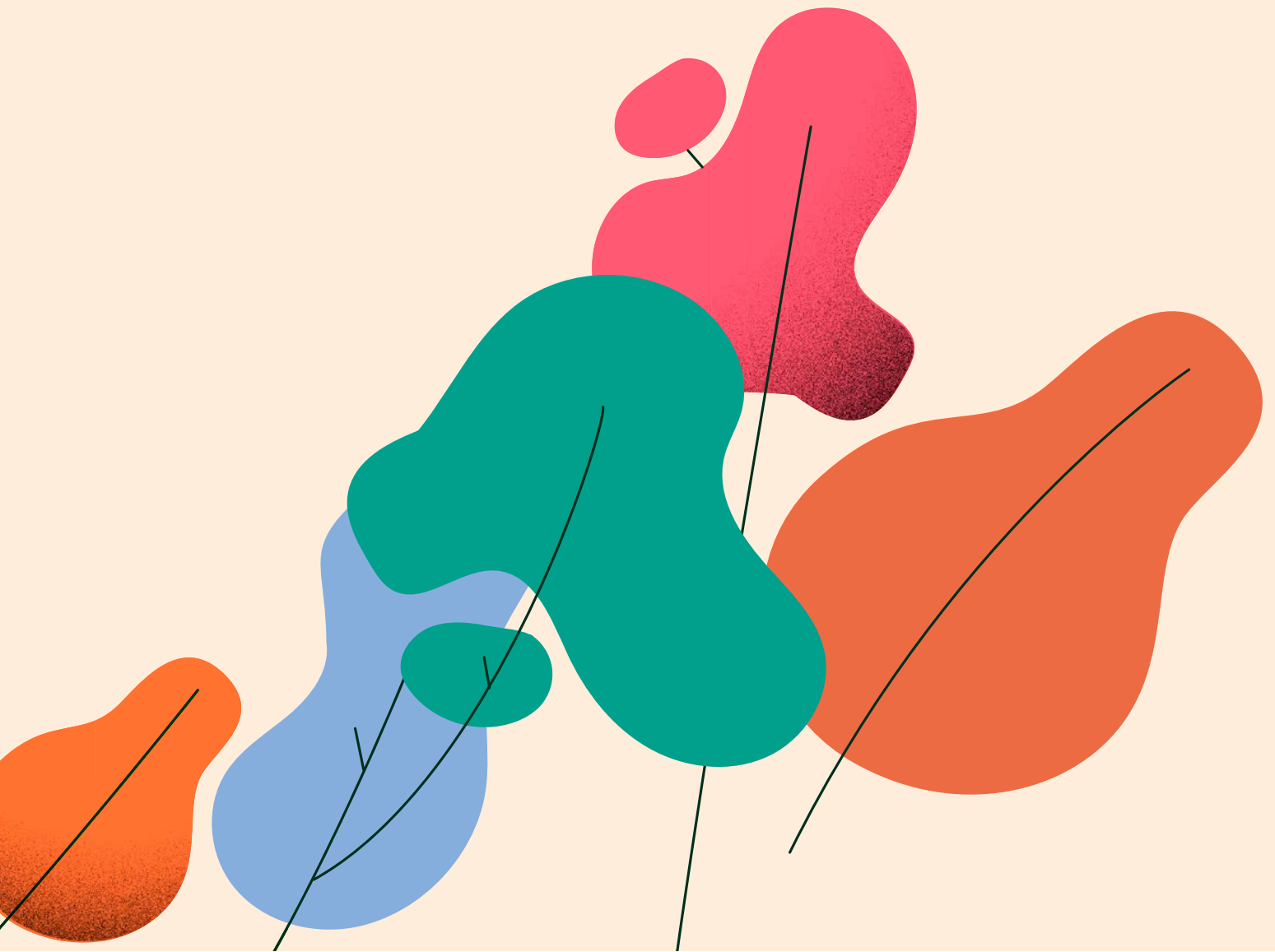
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FOREST, AGRICULTURE AND COMMODITY TRADE DIALOGUE

A Roadmap for Action





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A SHARED PATH FORWARD

A joint statement of the Forest, Agriculture and Commodity Trade Dialogue

The purpose of the Forest, Agriculture and Commodity Trade Dialogue is to promote sustainable development and trade while protecting forests and other critical ecosystems

Addressing these issues together is important because they are strongly interlinked, and because the world can achieve urgent and decisive shifts to the benefit of all countries through greater collaboration.

Agricultural commodities are essential to achieving the Sustainable Development Goals, notably by promoting economic development, reducing poverty, contributing to food security, and improving the livelihoods of billions of people. At the same time, expanding areas for unsustainable agricultural production and other forms of land degradation may pose critical challenges to our environment, the sustainability of forests and other important terrestrial ecosystems, as well as increasing emissions, reducing resilience to climate impacts, and contributing to biodiversity loss. Addressing these shared challenges is essential to meeting the goals of the Paris Agreement and the Sustainable Development Goals.

The FACT Dialogue has identified an indicative roadmap of actions set out in a 'Chairs' Statement' on four key and related areas of work which are central to achieving our overall objectives: trade and market development; smallholder support; traceability and transparency; and research, development, and innovation.

We commit to continue our dialogue in an open and inclusive manner, based on our respective national interests, circumstances, and capacities. We will work together to share experiences, find common ground, support implementation, and encourage further ambition in support of our shared aims, respecting and complementing existing multilateral processes. We will meet regularly as Ministers to give direction to this process.

Together, we welcome continued dialogue with all governments, as well as civil society groups and the private sector, as we take forward this work over the years ahead.

This statement is supported by:



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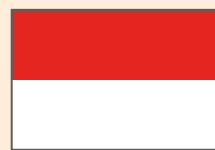
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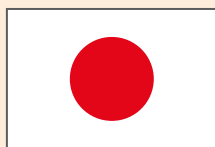
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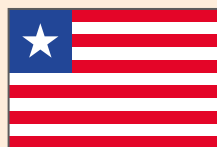
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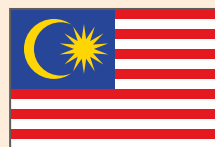
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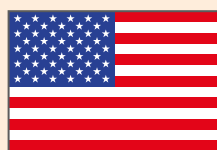
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of America



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CHAIRS' STATEMENT

In 2021, participants in the government-to-government FACT Dialogue, informed by a multi-stakeholder taskforce, held discussions on four thematic and related areas: trade and market development; smallholder support; traceability and transparency; and research, development, and innovation.

Informed by the **principles of collaboration**, the four thematic working groups under the leadership of co-facilitators shared ideas, exchanged best practices and discussed actions that countries could take forward in collaboration. Drawing on these the Co-Chairs, the United Kingdom and Indonesia, have identified the actions below for further discussion, development and implementation as appropriate. These actions are non-exhaustive, non-binding and do not apply in all circumstances to all countries.

This is a work in progress with participants expressing their desire to deepen collaboration, through this dialogue, after COP26.



Trade and Market Development



Smallholder Support



Traceability and Transparency



Research, Development and Innovation



KEY FACTS

Agriculture, Forestry and Other Land Use (AFOLU) activities accounted for around 13% of CO₂, 44% of methane (CH₄), and 81% of nitrous oxide (N₂O) emissions from human activities globally during 2007–2016, representing 23% of total net anthropogenic emissions of greenhouse gases (GHGs).

TRADE AND MARKET DEVELOPMENT



Issues of trade and markets lie at the heart of the FACT Dialogue. An important priority is to secure and grow market share for sustainably produced agricultural commodities.

Collaboration at the global level is crucial, as both demand and supply sides measures are needed.

The focus of this working group is therefore on how global markets can better incentivise sustainable agricultural and forest commodity production and trade, while supporting jobs and livelihoods, and protecting forests and other terrestrial ecosystems.

Informed by the discussions held between countries, the co-chairs alongside Colombia, as co-facilitators of this working group, identified the following actions for further discussion, development, and implementation as appropriate:

- i. Explore options for how supply and demand-side market and trade policies can be more complementary and mutually reinforcing to better incentivise sustainable production and consumption. This will help to close the existing gaps between production and consumption policies.
- ii. Map how the FACT Dialogue can better support other international processes and fora that address the issues of sustainability in regard to trade and markets.
- iii. Build understanding of common factors necessary for sustainable production in a way that helps establish common expectations among producer and consumer countries. This will draw from experience and existing practice of national and international standards.
- iv. Explore ways to strengthen and broaden international market recognition of national approaches to providing assurance of sustainability. This could build common understanding of consumer interests in sustainable practices, as well as national requirements in producing countries, and facilitate market access.



KEY FACTS

1.6 billion people depend on forests to support their livelihoods, including Indigenous People and local communities, smallholder farmers, and employees of forest-based enterprises.

SMALLHOLDER SUPPORT



Smallholder farmers are central to the aims of the FACT Dialogue. Smallholders produce a material share of global production in many of the agricultural commodities that are sometimes associated with deforestation.

They face challenges relating to climate change impacts, the security and resilience of their livelihoods, productivity, and capacity. As markets move towards higher environmental standards, smallholders also face the risk of exclusion if unable to meet those standards. Scaling-up the support and finance available to smallholders is important to address all of these challenges, but reaching the many millions of small farmers and providing support effectively and efficiently is also a major challenge of logistics and governance.

The aim of discussions under this theme was to consider how to improve conditions for smallholder farmers and support their engagement in actions to reduce deforestation, including through policy reforms and measures to improve security of livelihoods and access markets, support to strengthen capacity and increase productivity in a sustainable way, and measures to improve access to and availability of finance.

Informed by the discussions held between countries, the co-chairs, alongside Ghana and Malaysia as co-facilitators of this working group, identified the following actions for further discussion, development, and implementation as appropriate:

- i. Map and consider existing smallholder support schemes to learn about different approaches, assess the impact of different approaches on sustainability outcomes, identify gaps and begin working on opportunities to strengthen national and international efforts.
- ii. Exchange best practice and identify effective approaches to scaling up support and finance for smallholder farmers (including through national support schemes, public-private partnerships, the private sector, the finance sector, and Official Development Assistance (ODA)). This can include support to increase productivity in a sustainable way, reduce vulnerability and increase resilience to climate change, market shocks and other major risks to livelihoods.
- iii. Improve access to and availability of finance for smallholders, including to support the transition towards sustainable production; and strengthen enabling conditions including through living income, security of tenure, capacity building, training and technical assistance.

TRACEABILITY AND TRANSPARENCY



Traceability and transparency are critical to the aims of the FACT Dialogue. Systems and technologies which enable traceability and transparency provide the basis for certification schemes and assurance of origin.

They support efforts by national governments to apply and enforce laws which underpin sustainable production, efforts by companies to ensure sustainable sourcing of agricultural commodities, and efforts by stakeholders and civil society to enhance accountability. They can also help to create investor confidence.

The aim of discussions under this theme was to identify measures and opportunities for enhanced collaboration, drawing on technological developments, digital innovation and institutional strengthening, to facilitate increased trade in sustainable agricultural commodities and enhanced the protection and the sustainable management of forest and other critical ecosystems.

Informed by the discussions held between countries, the co-chairs alongside Ghana, as co-facilitators of this working group, identified the following actions for further discussion, development, and implementation as appropriate:

i. Assess existing traceability and transparency systems and identify the

most significant data gaps that need to be addressed to enable traceability and transparency in international forest and agricultural commodity supply chains.

- ii. Develop a set of guidelines, working with international organisations and building off existing initiatives, that will help to inform national government approaches to data sharing and data management on forest and agricultural production, and commodity supply chains. The intention would be for the guidelines to promote compliance with national laws and policies, and enable better monitoring and protection of forests and other critical ecosystems. They would consider and recognise the importance of existing government and stakeholder commitments, costs, technology, interoperability, and accessibility while protecting vulnerable people. In recognition that countries face different challenges in developing their data systems, and to encourage continuous improvement, the guidelines could also recommend ways for governments to further raise ambition. They would also explore in due course how best to apply the guidelines within the international system.
- iii. Support countries and stakeholders to identify and access funding, technical assistance and capacity building to strengthen traceability and transparency systems and promote interoperability between systems.



RESEARCH, DEVELOPMENT, AND INNOVATION



Research, development, and innovation are needed to support the aims of the FACT Dialogue in a range of ways.

This includes through driving both productivity improvements and intensification in a sustainable way to meet demand for agricultural and forest commodities and, at the same time, minimising expansion of the land area required to grow them; innovations to management practices, such as landscape approaches which balance production with protection; and dissemination of knowledge to support trade and market development, smallholder support and traceability and transparency themes.

The aim of discussion under this theme was to identify how a broad range of research, development and innovation in the agriculture and forest sectors can support the aims of the FACT Dialogue.

Informed by the discussions held between countries, the co-chairs alongside Brazil, as co-facilitators of this working group, identified the following actions for further discussion, development, and implementation as appropriate:

- i. Align our efforts to accelerate innovation in areas most relevant to the objectives of the FACT Dialogue such as sustainable intensification and minimising land expansion, including through oneCGIAR, the Agricultural Innovation Mission for Climate

(AIM4C), and the Global Research Alliance on Agricultural Greenhouse Gasses (GRA), and the coalition in support on Global Action Agenda on Innovation in Agriculture.

- ii. Strengthen capacity of national institutions to undertake and lead research partnerships, and to disseminate and scale best practices among farmers, including through north-south, south-south, and triangular cooperation.
- iii. Identify and disseminate research, development, and innovation to support the aims of the FACT Dialogue, including innovations to management practices, such as landscape approaches which balance production with protection; and dissemination of knowledge to support the trade and markets, smallholder and traceability and transparency themes.
- iv. Invest in and scale up agriculture research and innovation in order to promote more climate resilient low emissions agriculture technologies and practices



KEY FACTS

Forests cover 31 percent of the global land area. Approximately half the forest area is relatively intact, and more than one-third is primary forest.



CLOSING REMARKS

The co-chairs, United Kingdom and Indonesia, are grateful for the participation of countries in the FACT Dialogue and thank them for the positive and collaborative spirit in which these discussions have been held.

The co-chairs also express their sincere thanks to the multistakeholder taskforce for bringing diverse perspectives and expert recommendations to inform the Dialogue.

We look forward to progressing this work together in 2022 and beyond, recognising the importance and urgency of this agenda for all countries.

“

At the heart of this statement is a recognition of the scale of the challenge before us, and the responsibility we have to ensure that essential trade in commodities does not contribute to deforestation, land degradation and unsustainable practices.

Lord Zac Goldsmith and
Vice Minister Alue Dohong

”





AWS STANDARD 2.0 GUIDANCE

01.01.20

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INTRODUCTION TO GUIDANCE

This document provides guidance to implementers of the AWS International Water Stewardship Standard V2.0 (AWS Standard). This document (Guidance) is structured around each of the five steps in the AWS Standard. General guidance is provided for each step with additional details, examples and references for the specific criteria and indicators provided as necessary. Additional guidance on specific topics is also included.

The Guidance was developed by members of the AWS Technical Committee based on the new version of the Standard (version 2.0), input from members and stakeholders, and material from the version 1.0 guidance that is still applicable. Unlike with version 1.0, the guidance for version 2.0 is a separate document that will be subject to ongoing updating and revision as required based on lessons learned, and experiences gained during use of version 2.0. For more details on the process used to develop the AWS Standard, visit the AWS website: a4ws.org.

The Guidance has two primary purposes:

- (1) **To help the implementer** gain a better understanding of how to implement the AWS Standard.
- (2) **To help auditors** ensure consistency and rigour in the interpretation and application of the AWS Standard and thereby maintain consistency between sites, in combination with the AWS Assurance system

The Guidance is not a textbook or primer on specific topics or disciplines. The implementer should not depend on this Guidance to learn or master specific principles or subjects as it does not provide that level of detail. The user may obtain additional expertise on specific topics via other experts or reference documents.

Two important notes:

- (A) **The Guidance is designed to supplement the Standard and is not intended as a stand-alone document.** AWS recognizes that this current document is time-limited and not comprehensive. Therefore, like the AWS Standard, the Guidance will undergo periodic review and updating to reflect experience and current best practice.
- (B) **It is anticipated that through time, the Guidance will be expanded to include both regional and sectoral supplements.** Some topical guidance is included in this version as special sections at the end. Until such time, AWS will seek to generate and make available specific regional and sectoral supplements. For more details on whether such a regional or sectoral supplement exists for your region/sector, please visit the AWS website: a4ws.org.

OVERARCHING GUIDANCE

Members of AWS unite behind the organizational intention in developing the AWS Standard – to provide a common, credible, globally-applicable framework for major water users to understand their own water use and impacts, and to work collaboratively and transparently with others for sustainable water management within the wider water catchment.

The Standard has five outcomes. The intent of these outcomes is to act as fundamental “pillars” of water stewardship – or themes that are reflected in all water stewardship efforts. They represent fundamental aspects of water:

- how humans are responsible and accountable for water (governance);
- the quantities and timing of water (water balance);
- the properties of the water (water quality);
- the spatial aspects of areas that may or may not contain water at a given time, but that are critical to maintaining the human-derived benefits of water including the ecosystem services from Important Water-Related Areas (IWRAs), and
- the provision of safe water, sanitation, and hygiene for all.

A Theory of Change (ToC) articulates what impact or change an organization is hoping to achieve in the world and how its work brings about that change. The ToC has been updated to align with version 2.0 and takes a broader view covering the AWS Standard, the AWS Standard System and the AWS Organisation. The AWS Standard should therefore be understood as one part of a set of strategies and activities used by AWS and its stakeholders to bring about positive change.

The ToC argues that if a series of inputs is combined with a set of good water stewardship practices (or actions), then improved outcomes in water governance, water balance, water quality, Important Water-Related Areas, and Water, Sanitation and Hygiene (WASH) will provide social, environmental and economic benefits (or impacts) to various stakeholders. This change model underpins the logic of the AWS Standard and the impacts monitoring system.

While the Standard is structured around 5 steps, it is important to note that a site need not follow the order laid out in the Standard. Indeed, the Standard is intended to be iterative and non-linear, meaning that a site may need to jump between steps and is expected to repeat many (if not most) of them through time. Certification is determined by conformance with the criteria and indicators, not the process followed. In other words, a site may implement any given criterion within a step and then jump to another criterion (and step) if it wishes.

Several areas of the Standard require knowledge that may be beyond that of a given site. In these instances, sites are encouraged to speak to AWS for suggested partners and water experts who can assist with specific, technical work if necessary. In all cases, AWS will endeavour to connect sites to service providers and assist in identifying opportunities for collaboration.

Wherever possible, examples of tools, initiatives and other resources have been provided in the Guidance. These are not meant to be exclusive or comprehensive, but rather illustrative of the types of efforts that are in keeping with the intent of the given criterion. It is AWS's hope that these examples will be built out through time and updated as initiatives emerge and evolve.

Since the Standard is site-focused, AWS encourages companies or water service providers with multiple sites to perform a water risk analysis for all their sites before selecting specific sites at which to implement the Standard. This water risk “portfolio review” will allow an implementer to be much more strategic in the application of the Standard. AWS would suggest exploring emergent approaches to water risk assessments but does not specify any one tool as proprietary. Where multiple sites are co-located within a catchment, group certification may also be a possibility.

Generally speaking, advanced-level criteria are mostly mutually exclusive. However, any effort that happens to qualify for multiple advanced-level criteria can be credited for only one criterion. In other words, if an action had been undertaken and it met the requirements for three different advanced-level criteria, only one criterion's points would be gained.

AWS recognizes that there are many parts of the planet where water data are not readily available. Accordingly, if data are not available for a given criterion in the Standard, evidence documenting the reasonable effort undertaken by the site to procure the data may be used as a proxy. The acceptability of this alternative indicator data is ultimately at the discretion of the auditor.

The Standard was designed around the management system concept of Plan-Do-Check-Act. Hence the five steps reflect these concepts. Secondly, the Standard is built on the foundation of continual improvement, so the user's water stewardship system and actions are expected to lead to improvement but to also constantly check itself to ensure problems are corrected and aspects evolve to build upon work to date. Finally, the Standard has both process requirements - defining how the organization does things, and performance requirements - that specifically call for improvements in the impacts from these actions.

STEP 1: GATHER AND UNDERSTAND

GENERAL GUIDANCE FOR STEP 1

Gathering data. The organization is not required to physically collect all data itself but may also use existing data and information from other sources and studies. The organization is usually best able to collect data from its own site, but for the surrounding catchment, there are often other sources available. Because data gathering can be expensive or not logistically practical, AWS recognizes costs should be realistic, but the organization should show it has made reasonable efforts to obtain sufficient data for a reliable water stewardship assessment.

Data availability and sources. The availability of publicly accessible data and information on water varies enormously across the world. In developed countries, it is commonly comprehensive. For example, most countries in Europe have detailed geological maps and publicly-funded databases with detailed information (geographically and over time) of such subjects as geology, surface water bodies, aquifers, water quality, flows and their variability, climate, water withdrawals, and water resources availability. This information may be in the form of reports, maps or databases, on or offline. In addition, there are many thousands of academic studies available on water resources, mostly available online, and for free or for a reasonable fee.

In developing countries, in contrast, there may be relatively little information, especially in more remote and less densely populated areas. However, an expert can still learn much from studying maps, geology, satellite photography, a field visit, and by directly collecting data (for example, water samples for analyses). Where relevant data cannot be identified, the organization should show it has made a reasonable and proportionate effort to do so.

The value of experts. Experts with local experience will have valuable knowledge and will also know where, or to whom, to go for additional information and data. Water resources experts will have experience in 'on-the-ground' assessment to understand the catchment, local water issues, land use impacts and Important Water Related Areas.

Where to start. The organization should first refer to studies or information it may already have from activities related to water supply, wastewater, environmental compliance, and sustainability reporting. A site with its own groundwater sources (boreholes) will usually already have studies and data related to its water sources and catchment.

Timescales for data measurement. Water use information needs to be considered on a number of different timescales. A yearly timescale is relevant for a gross water balance of the site and catchment. Longer timescales of years are relevant for understanding long term trends, such as gradual changes in water quality and water availability. Periods of weeks or months are relevant for seasonal variability. For example, a catchment may be naturally water abundant for part of the year, but water scarce at other times, due to seasonality of rainfall or snowmelt. For water abstraction points, it is more typical to measure flow volumes in much shorter timescales such as cubic meters per day (m³/d), or liters per second (L/s).

1.1 GATHER INFORMATION TO DEFINE THE SITE'S PHYSICAL SCOPE FOR WATER STEWARDSHIP PURPOSES

1.1.1 Defining the physical scope is fundamental to the water stewardship process. It defines where to collect data, where to assess risk and the geographical scope for stakeholder engagement. The physical scope is a different concept than catchment, but they overlap. The glossary definition is:

Physical scope: *The land area relevant to the site's water stewardship actions and engagement. It should incorporate the relevant catchment(s) but may extend to relevant political or administrative boundaries. It is typically centered on the site but may include separate areas if the origin of water supply is more distant.*

A catchment (surface or groundwater) is defined by geography, hydrology, and geology. However, a site often needs to be more flexible in defining the area (or scope) to which it should apply the principles of water stewardship. Examples of where the appropriate physical scope may differ from the catchment are:

- A site relies wholly on municipal water and wastewater services whereby the water sources and wastewater destination are in separate catchments to the site. The site still needs to define a local area around it for engagement and actions.
- The catchment is disproportionately large compared to the size of the site and its normal activities and the site only actually interacts with a portion. In this case, the physical scope may be smaller than the entire catchment.
- The water catchment is small, but the site has a size and public profile that justifies extending its scope for water stewardship to a wider political boundary. In such a case, it is important to be aware that for stakeholders the limits of the site's actual catchment may have limited relevance.

The **site's boundaries** are the boundaries of land owned or leased by the organization, which may or may not be contiguous.

Water sources owned or managed by the organization (private water sources), are typically surface water intakes, or boreholes for groundwater. Individual water sources are potentially the most vulnerable aspect of a site's water supply security. Each water source should be known in terms of its location, design, age, condition and risks.

- For **surface water**, the source is typically a 'water intake' structure installed on and in the water body, with pumps and filters (to prevent uptake of debris, fish, vegetation, etc.). The type of risks to be assessed and mitigated include: low flow or low water level conditions; freezing; turbidity; vulnerability to pollution from spills in the water body; presence of polluting activities upstream on a river. Surface water sources are particularly vulnerable to pollution which can move very rapidly in open water, especially in flowing rivers. Compared to groundwater sources, the condition of a surface water source is relatively easy to see and assess.
- For **groundwater**, the source is typically a borehole (also called a water well, or a tubewell). Many boreholes in use today are decades old. If not properly maintained, their performance will deteriorate through corrosion, clogging and potentially collapse. Even when well maintained, they may eventually need to be replaced. Additional risks to be assessed and mitigated include: contamination from pollution of the aquifer; contamination from spillages at the surface (for example, by flood waters); and falling water levels due to abstraction by others or drought. For boreholes, the site should have documentation to include: borehole design, protection measures, monitoring program and maintenance program. See additional guidance on groundwater (pending).

For **water service providers**, identify who they are and the main water bodies from which they abstract water (for example, a named river or aquifer). Identification of individual abstraction points is not required. Some suppliers may be reluctant to share information based on security and confidentiality. In this case, the organization should show it has requested information and explain why it could not receive it.

Discharge points are where the organization discharges water or wastewater (treated or untreated) directly into the environment. The discharge points should be identified and mapped. For **wastewater service providers**, identify who they are, the ultimate destination of their discharges (for example, a receiving water body), and level of treatment (none, primary, secondary or tertiary).

The **catchment** relevant to the site's water and wastewater may be surface water-based, groundwater-based or a combination of both. See the 'Catchments' section for detail on how catchments are defined and mapped. Mapping a catchment may require specialist expertise, especially for groundwater.

1.2 UNDERSTAND RELEVANT STAKEHOLDERS

Stakeholder: Any organization, group or individual that has some interest or 'stake' in the implementing organization's activities, and that can affect or be affected by them. The four main categories of stakeholder are: (1) Those who impact on the organization; (2) Those on whom the organization has (or is perceived to have) an impact; (3) Those who have a common interest; (4) Neutral - those with no specific link, but with whom it is relevant to inform.

Of most relevance to water stewardship are stakeholders associated with water use and dependency, but engagement should not be limited to these. The section of this Guidance on stakeholders provides more detailed guidance on how to identify, understand, categorize and communicate with stakeholders.

Figures 1 and 2 provide a diagrammatical reflection of how stakeholders' power, interest, influence, and engagement relate. These diagrams are useful to characterize stakeholders identified in this criterion.

1.2.1 A recommended approach is to undertake a stakeholder mapping exercise and create and maintain a table or database listing each stakeholder, how they are linked to the organization, any water-related concerns or challenges they face, and a summary of communications with them. Pay particular attention to traditionally disadvantaged and potentially less-vocal groups, such as Indigenous communities, women, children and the elderly. The stakeholder mapping should also show any linkages among stakeholders.

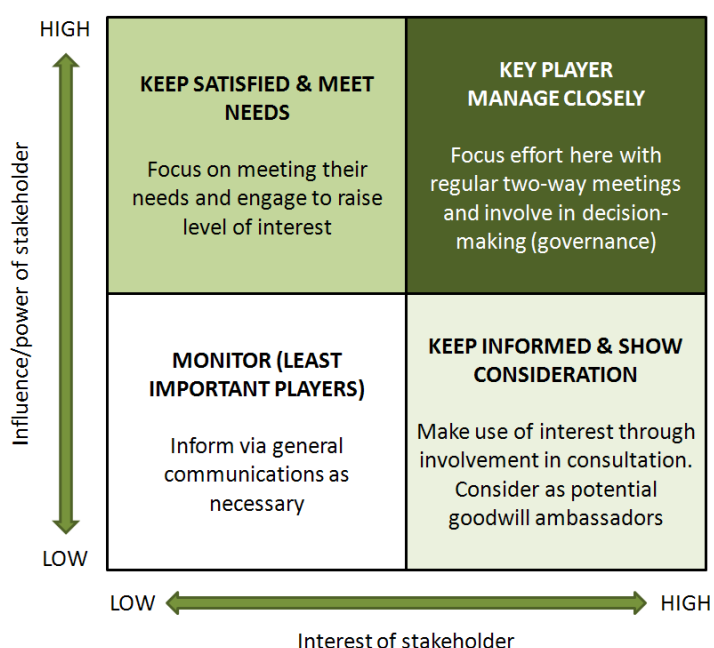


Figure 1: Stakeholder power, interest and engagement matrix

Water-related challenges of concern to stakeholders may be those related to the site's activities (such as water use and wastewater management), or to more general catchment level influences, such as water scarcity, pollution, flood risk, infrastructure or regulation. The site should identify the water-related challenges of stakeholders as a part of the stakeholder engagement process. The type of challenges can vary greatly, depending on geography (remoteness), climate, and the nature and activities of the stakeholder. Some examples include:

- Unable to obtain sufficient water for their needs, due to physical or regulatory limitations (relevant to the WASH outcome)
- Water quality concerns

- Water and/or wastewater prices
- Over extraction of water resources
- Limited or no access to traditional lands
- Increasing risk of drought and water scarcity including climate change
- Water quality concerns in popular fishing areas (whether for food or sport)
- Concern for bathing water quality (in outdoor natural water bodies)
- Flood risk
- Impact of development on significant water places.

The scale of water challenges in a catchment can range from minimal to highly significant depending on local circumstances. In a developed region with universal provision of safe drinking water and sanitation, the challenges may be very limited. In a region with low rates of water and sanitation provision and/or subject to regular droughts, the challenges can be widespread and significant.

1.2.2 The organization should make a judgement on its potential to influence water stewardship in the catchment. This may be partly based on the findings of the stakeholder engagement process. Factors affecting influence include:

- The economic or physical size and number of employees compared to other organizations in the catchment. A large high-profile organization will likely have more potential to influence than a small anonymous one.
- The density of similar organizations within the catchment. One small employer out of many may have relatively little influence compared to a major employer in the catchment.

The potential to influence can depend on the political culture of the region and how open it is to private organizations taking a proactive role in policy development, water governance or actions outside its own boundaries. For each stakeholder, the site will have a different potential to influence them, depending on their roles, interests and relationships. Methods of influence include:

- **Partner:** Work together as equal partners to address a common water challenge.
- **Involve:** Where the site takes a lead on an initiative and involves other organizations or groups with a common interest.
- **Consult:** Actively meet or discuss proposed actions.
- **Inform:** Let stakeholders know what you are doing, allowing them to respond if they have questions or concerns. Communication may be, for example, by letter, email, posters, mailbox pamphlet or newspaper announcement.
- **Reciprocate:** Explore if there is action you can take in return

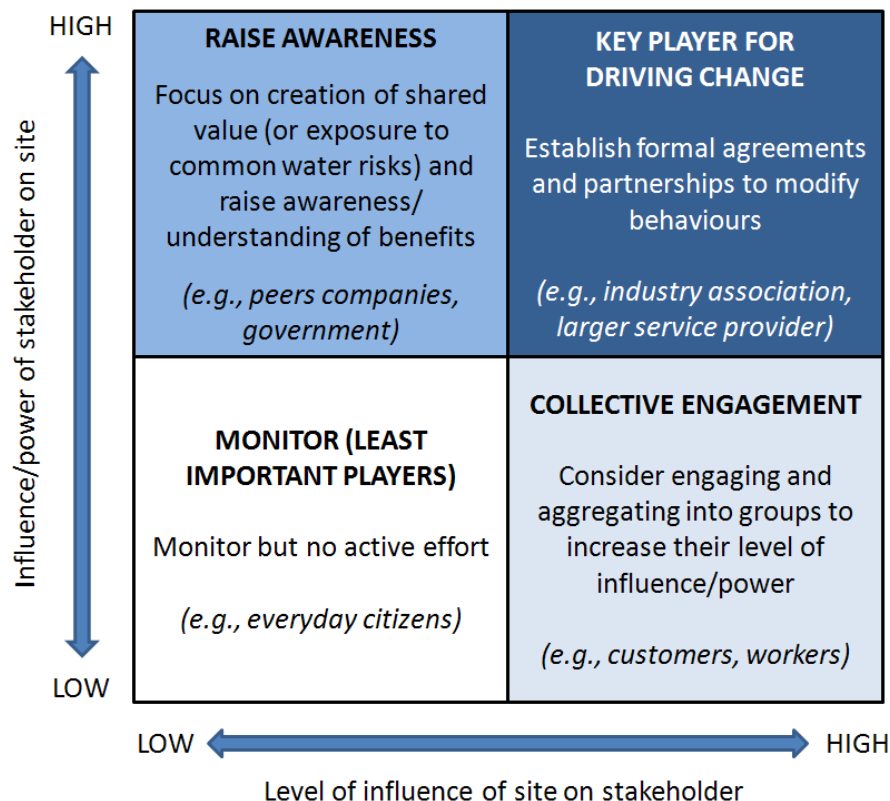


Figure 2: Stakeholder influence and engagement matrix

1.3 GATHER WATER-RELATED DATA FOR THE SITE

1.3.1 The organization needs to be aware of water-related emergencies and be prepared to react to them. This indicator requires the site to identify any existing emergency-response plan it has (if any) that addresses water-related risks and events. It may be part of a general incident response plan or may be specifically for water-related events.

1.3.2 The water balance is an equation based on an assessment of water inflows, outflows, onsite water storage and changes in storage. The first step is to identify each main flow and water storage component on site, and to map it. The locations of key flows and storage should be shown on a scaled site map. For numeric information, it may be clearer to show these on a schematic diagram.

- Typical water inflows are from incoming water supply and onsite rainfall (if used or stored). Rainfall that drains quickly offsite need not be included. In rare cases, water contained in incoming materials (such as fruit, vegetables or dairy) is extracted and used as process water. In these cases the water should be included in the balance.
- Typical outflows include: Wastewater, run-off (e.g. from drainage areas or washing facilities), leakage, evaporation, and water contained in manufactured product (e.g. beverages)
- Typical water storage components include: Water storage facilities (open reservoirs, closed tanks), fire-fighting water tanks, and water contained in pipework (which can sometimes be significant)

1.3.3 The water balance equation must balance and so is useful for verifying that water volumes and flows are reliably measured and accounted for. For example, if measured outflows are too small compared to inflows, it can be an indicator of unaccounted for leakage or evaporation. Given that it may be difficult to accurately measure some flows, an error of up to 5% difference between inflows and outflows is acceptable.

The water balance equation:

$$(\text{Water outflow}) = (\text{Water inflow}) + (\text{Change in storage volume})$$

A basic water balance is commonly done on a one-year timescale. It may also be appropriate to calculate it for shorter timescales: seasonally, monthly, weekly or daily. A monthly timescale can be appropriate when there are significant seasonal variations in water use or availability. Weekly or daily timescales are appropriate when there is significant short-term variability in how water is used operationally.

Some water flows, or volumes are easy to measure, such as with flow meters or known water tank volumes. Others may have to be estimated. For example, nonpoint source losses such as underground leakage (which can be difficult to measure), evaporation and run-off cannot usually be measured directly.

Annual variance in water usage rates refers to the importance of understanding the variability of water demand through the year and how it correlates with availability. The site needs to know whether water availability and system flexibility are sufficient to meet peak demands. For example, irrigation rates are often higher in the driest times of the year. Some manufacturing operations have strong seasonal variability. For example, drinks production is often higher in warmer times of the year when consumer demand is higher. A site needs to know whether the water supply system, for example a municipal network, reservoir or aquifer, can meet its higher demand rates without negative impacts on the natural environment or other water users. Where there is an impact, or high risk of impact (water-related challenge), then the high and low variances (peak/low availability and peak/low demand), should be quantified.

To do this, the site should monitor its water usage rates through the year (ideally over a number of years) and identify and quantify its highest and lowest rates. It should also understand what the available supply rates are across the year, which may vary due to seasonal changes or demand. For example, water demand may increase in the summer. How to do this depends on the type of water supply:

- For a municipal supply, the supplier can advise at what extraction rates the site can draw water, which may be constant through the year or variable.
- For a private water supply, the rate may be limited by the physical capacity of the water source or by permit conditions. The water body (surface water or aquifer) may have less availability at certain times of year, due to lower water levels or flows, which in turn may be due to seasonal weather conditions or increased demand by other water users.

A condition where peak demand matches or exceeds what is available is a risk. The ideal situation is to have a buffer between availability and peak demand to reduce the risk of a limitation in supply and other negative impacts.

1.3.4 Water quality information is important for understanding risks to and from the organization, as well as showing whether the organization's wastewater has a negative impact. The site should maintain records (for example, a recommended minimum five years) of the quality of all incoming water supplies, outgoing effluent (after treatment where applicable) and of water bodies that receive the effluent.

For its own water sources and wastewater discharges, the organization will usually collect its own samples on a regular basis for laboratory analyses. External service providers can usually provide water quality data. If not already publicly available, the organization should request it. Note that the provider may claim that any information not legally required to be disclosed is confidential.

Water and wastewater quality data should be used to verify compliance.

Where a water quality-related challenge is identified (e.g. water quality exceeds or is close to a regulatory or other accepted quality limit), the site should quantify how the quality compares to limits (for relevant parameters) and clearly identify breaches and trends of concern. For example, a drinking water parameter may be within compliance, but gradually increasing over time, indicating future non-compliance and risk.

1.3.5 The organization has a responsibility (usually legal, but also ethical) to avoid causing pollution of the natural environment, including water bodies. It is recommended to use an expert to identify actual and potential pollution sources, and the risks they present. In the context of water stewardship, it is especially important to identify pollution sources that present a risk to water bodies and water abstraction points. Examples of pollution sources include:

- Point sources: chemical storage area, waste disposal facilities, leaks of oil or chemicals, maintenance facilities (where oils and chemicals are used), electrical transformers (a potential source of oils and PCBs), livestock facilities (where animal waste may concentrate)
- Non-point sources: site drainage channels, runoff from the use of agricultural chemicals on land (e.g. fertilizers, pesticides), and stormwater runoff.

Examples of water bodies at risk include:

- Water table aquifers, without natural protective cover (e.g. overlying low permeability layer), to which surface pollution can rapidly infiltrate
- Water supply boreholes which abstract from 'at risk' aquifers
- Surface water bodies which can receive site run-off, drainage discharge (from drains, etc.) or wastewater discharges. Note that storms and flood events may transport pollution farther than normally expected.

It is recommended to tabulate and map pollution sources, their nature and their risk, along with vulnerable water bodies.

1.3.6 Important Water Related Areas (IWRAs) are defined in the Glossary and a special subject section. Each onsite IWRA feature should be listed, with a description of what it is, its status (including indigenous cultural value if applicable) and any water-related risks. Regarding status, it should be reported whether it is in good, poor, deteriorating or improving condition. A more specific rating system is suggested in the IWRA chapter of this Guidance. Specific concerns, such as 'polluted' or 'drying' should be noted. Photographs of its original and current condition and any other monitoring of changing condition would be valuable. As such assessments can be subjective, the site should consider consulting with appropriate experts or stakeholders, such as local conservation NGOs. This will strengthen the credibility of assessment and may be the only true way to understand why an area is important.

1.3.7 Water-related costs are often broader than initially perceived; they include more than just procurement of water and treatment of water. They include all costs related to understanding and managing water stewardship. The site should be aware of the scope, for both short-term and long-term investments and be able to demonstrate it has the financial commitment and resources to support them.

The cost analysis should consider, but not be limited to items such as: payment for experts, fees and levies, data collection, technical studies, capital investments and depreciations, risk mitigation actions, stakeholder engagement activities, external communications and staffing, being either 'one-time' actions or events, or operational expenses, and for ongoing monitoring, maintenance and management of water resources.

In most cases, a site is less likely to generate water-related revenues, but it should identify them wherever existent. Examples include provision of direct water supplies to others and provision of treated wastewater for reuse such as aquifer replenishment or irrigation. Restoration and protection of an IWRA (such as a wetland) may provide cultural or amenity value.

Further examples for water-related costs:

- Water supply (whether to external supply or internal operational costs)
- On-site water treatment

- Energy: to move, treat, heat or cool water
- Provision and maintenance of water-related infrastructure
- Fees for supply, permits and taxes
- Risk mitigation actions
- Stakeholder engagement and associated activities

Examples of water-related revenues

- Sale of water from the site, which could be excess water supply or treated wastewater

Examples of water-related value creation

- Contributions to restoration and protection of an IWRA which may have added benefits such as recreation, cultural, biodiversity, etc
- Free or subsidised provision of water or treated wastewater to other users. For example, treated wastewater may be donated to farmers for irrigation
- Treated wastewater contributing to local aquifer recharge

1.3.8 Briefly describe the nature of the drinking water and sanitation facilities on site. Explain to what extent they comply with local laws and international guidelines such as from WHO, taking into account people numbers. This should include all categories of onsite workers and expected visitors taking account of gender, age, religion and mobility and any vulnerable groups. Where provision does not comply with law or international guidelines, an explanation should be given of why, and what efforts are in place to correct this.

The appropriate 'level of access' or 'adequacy' may depend on ground conditions, climate, local context, and cultural and behavioral traditions. WASH provision includes, but is not limited to, water points and fountains, toilets, washing facilities, hygienic areas for food and drink consumption, and potentially showers. This indicator is linked to indicator 3.6.1. There is much available information from various sources on the topic of WASH, some links include:

UNHCR Refugee WASH Standards and Indicators (2020): <https://wash.unhcr.org/download/wash-standards-and-indicators/>

WHO: Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals (2018):

https://www.who.int/water_sanitation_health/publications/core-questions-and-indicators-for-monitoring-wash/en/

CEO Water Mandate: Guidance for Companies on Respecting the Human Rights to Water & Sanitation (2015):

<https://ceowatermandate.org/resources/guidance-for-companies-on-respecting-the-human-rights-to-water-sanitation-2015/>

1.4 GATHER DATA ON THE SITE'S INDIRECT WATER USE

Indirect water use is the water used within an organization's supply chain. That is, the water used in the creation, processing and transportation of goods and services supplied to the organization. The Standard recognizes that some sources of goods and services are outside of the site but within the site's catchment. It also recognizes that some of these primary inputs come from catchments other than the site's, and these could be at some distance from the site. To account for the increased complexity in dealing with this distinction, for example degrees of influence, control, and level of understanding, the indicators for the site catchment are core, but for other catchments of origin, they are depicted in indicators 1.4.1, 1.4.2, and 1.4.3 (Advanced).

There are two principle reasons to assess indirect water use. First, it will help an organization to understand associated risks to its own business or activities. For example, severe drought may impact on the availability or

cost of an essential food ingredient. Second, it is an opportunity for the organization to influence the water stewardship approach of its more important suppliers.

It is important to stress at the beginning that this criterion **does not involve mapping one's complete supply chain**. AWS recognizes that mapping one's supply chain is a complex, costly and time-consuming exercise, which, despite bringing beneficial insights, is beyond the capacity of many sites. Furthermore, AWS recognizes that for many sites (especially small and medium-sized enterprises), their ability to influence suppliers may be limited.

Rather, due to the above, this criterion is about beginning to understand the importance of indirect water use by sites and giving the site some degree of understanding of its reliance upon water (both quantity and quality) from other locations. The expectation is that once a site has begun to understand the importance of its reliance upon water in its supply chain, it can take action if necessary and/or steadily increase this understanding through time.

Despite the challenges, indirect water use is a very important part of water stewardship. Developing an understanding of indirect water use is something that is increasingly recognized as good practice, and there have been increasing efforts put into how to measure water use within the supply chain. Different sites will have a greater or lesser degree of reliance upon indirect water for their operations, and this should be considered when determining the level of expectation around continual improvement.

Sites that mainly rely upon direct water consumption for their operations and whose focus is the production of primary inputs (i.e. natural resource sectors who derive their revenues from the extraction of environmental goods – e.g. agriculture, mining, forestry, oil and gas) are likely to require less attention and a less sophisticated understanding of their indirect water use (since it is less- or non-material to their operations).

Sites that mainly rely upon input products for their operations and whose focus is on the modification/improvement of goods and services based upon primary products (i.e. sectors who derive their revenues from converting primary inputs into added value goods and services – e.g. manufacturing, processing, services) are likely to require more attention and a more sophisticated understanding of their indirect water use (since it is more or highly material to their operations). Sites that have agriculture products produced elsewhere in their supply chains are particularly sensitive to indirect water use.

As an initial step in understanding indirect water use, this criterion requires the site to gather information on **primary inputs** and **estimated origins**, as well as outsourced water use. Primary inputs are the main commodities (goods) and services (water, etc.) that go into the goods or services created by the site.

Primary inputs are the materially important product(s) or service(s) that a site consumes to generate the product(s) or service(s) it provides as its primary function. These can be thought of as the “main ingredients” that a site needs to run (e.g. aluminium, sugar (cane), CO₂, water and oranges, as well as an outsourced “cleaning service” for a site producing a canned, orange drink with bubbles). Note: primary inputs do not include infrastructure.

Generally, primary inputs should include any externally procured goods or services that account for over 5 per cent of the total weight of the goods generated, or 5 per cent of the costs of a site. For example, lumber, energy and water likely would be some of the primary inputs for a pulp and paper facility. Fertilizer, seeds and water likely would be the primary inputs for a vegetable grower.

Note: In the case that there is an input that does not meet this generic threshold (e.g. it is only 3 per cent by cost) but is significant in its water use (whether regarding quantity and/or quality) these should be included (if known). Through time, a site should work to make these determinations and distinctions to fully understand risk exposure through indirect water use.

Where products derive from commodity markets, this will be accepted as an end point that need not be traced back further. In such cases, global indirect water use numbers should still be used and through time, sourcing should be determined and/or estimated.

Where products are compound (e.g. an electronic circuit board with various plastic and metal components) and it is difficult/impossible to determine a simple indirect water use calculation, the origin should still be noted to determine if the product is being manufactured in a water stressed catchment.

The term “origin” is used in the criterion to provide sites with flexibility to identify the highest resolution of geographical data available from country down to catchment. Ideally, the smaller the area of the origin identified, the better. To conform with this criterion, the site should:

- Provide a list of primary inputs (or all material inputs) with their associated annual (or better) water use and origin (country/region/catchment – as appropriate) as well as the origin’s level of water stress;
- Provide a list of outsourced services that consume water or affect water quality and:
 - (A) If possible, obtain the water volume used by the outsourced service(s) (Mm3 or m3 per year or better);
 - (B) Estimate the site’s percentage of their business and extrapolate a value;
 - (C) Repeat (A) and (B) for water quality, focusing on water quality parameters of concern.

To conduct a simple indirect water use calculation:

- Gather a list of primary input commodities (“primary inputs” are defined above and in Appendix A: Glossary).
- For each commodity/input, list its total annual consumption (in kg, t, L, ML, or unit as appropriate) and its country/region/catchment of origin.
- Look up the water use through existing calculations. The site is not expected to generate new data, but rather draw upon existing data.
- Multiply the annual consumption amounts against the appropriate commodity/source region water footprint values to get an estimate of total footprint.
- Using readily available data (e.g. WRI’s Aqeduct Tool, WWF Water Risk Filter), review source locations to determine whether any water concerns are present in the basins being sourced (e.g. is the water use sustainable, or are the basins stressed?). Note any products/source areas of concern combinations that should be considered. These are the commodities that may experience price volatility or availability interruptions; therefore, consider alternative sourcing options and consider building into contingency planning.

Where data do not exist (per the above methodology), which is likely the case for composite inputs, the site is not expected to generate primary data. However, it is still expected to note the country/region/catchment of origin and whether the area experiences water risks (per the last step in the above methodology). The preference is to link the primary input to a catchment and note (and understand) that catchment’s water stress.

It should be noted that several well-recognized methodologies have emerged in recent years to measure indirect water use, most notably ISO 14046 Water Footprint Life Cycle Analysis methodology.

Outsourced services that consume water are typically processes that are required for the ongoing operations of the site. This is often, but not always, connected to cleaning services but may also relate to sanitation services or other water-related services.

Note: It is important to stress that for sites that rely upon indirect water, this criterion is based upon the premise of continual improvement. Through time, those sites that rely upon indirect water use are encouraged to undertake more comprehensive evaluations. This is a particularly important aspect of this criterion since the initial “primary inputs” identified may not be the most water-intensive/impactful products used by the site. Some low-volume products can have a very large water footprint (e.g. many animal products).

Continual improvement should come in the form of an ever-improving understanding of the sources of indirect water use, including being able to identify the most material inputs (from a water perspective), better understanding the status of the source catchments, and improving the temporal and spatial resolution of the site’s understanding.

1.4.1 Examples of indirect water use in primary inputs include the water used to grow food ingredients; in the manufacturing of purchased goods, such as packaging, machinery and parts; in mineral extraction.

1.4.2 Examples of indirect water use in services include offsite laundry services and offsite vehicle washing.

For indicators 1.4.1 and 1.4.2, at a minimum, the organization should identify its primary inputs and services and undertake an assessment to understand for each one, the following (as far as reasonably feasible), ideally in a table. This is most important for goods and services that originate from within the same catchment as the implementing organization:

- Annual water use (for the proportion of the goods the organization receives),
- Principal origin of goods (country, region, catchment),
- Where water is used,
- For what water is used,
- Water intensity for the goods/services,
- For goods/services originating from the same catchment, the origin of the water (e.g. the water body).

It is important to distinguish total water withdrawal from net water use (consumptive water use), the most relevant component. For example, electricity production may use large volumes of water for cooling, but most of this is returned to the local water cycle, with relatively little net impact.

The organization should show it has made a reasonable effort to gather the information, principally for goods/services sourced from within the site's catchment. The organization is not expected to undertake original studies or measurements, but to seek existing information. Sources of information may include:

- The supplier of the goods or services (who may already have undertaken an assessment of its own water use)
- Water management agencies (e.g. water regulators), who may already have good knowledge on the water users in the region or catchment.
- Sector or commodity-specific studies on water use. For example, 'water footprint' studies or studies on water use by relevant industry sectors
- An assessment of water-related risk presented by indirect water use within the catchment should be undertaken.

1.4.3 Primary inputs should include any externally sourced goods or services that account for over 5 percent of the total weight of goods produced by the site, or that represent over 5 percent of the costs. An input below this criterion, but still dependent on significant water use, should be included as a primary input.

1.5 GATHER WATER RELATED DATA FOR THE CATCHMENT

Criterion 1.5 is similar in approach to 1.3, but instead is looking beyond the site, into the site's catchment, and where noted, to the catchments of origin of the primary inputs. The Standard recognizes that moving beyond the site into the catchment introduces increased complexity and level of effort

1.5.1 Water governance. Water governance refers to how water supply, wastewater, water resources and the associated natural environment are managed by government agencies, institutions and other organizations. It includes water resources management, protection, allocation, monitoring, quality control, treatment, regulation, policy and distribution. Good water governance ensures responsible sharing of water resources in the interests of users and the natural environment in line with the principles of water stewardship and society's goals.

Where water governance institutions, policies and frameworks already exist for a catchment, region or country, it is important to be familiar with them and to work with them. Where catchment water governance is non-existent,

limited or poorly implemented, the organization has more potential, and in some cases, the responsibility to influence its improvement.

Developed countries typically have advanced and comprehensive water governance programs, including policy, regulation, enforcement and awareness raising programs. These usually consider the interests of the natural environment and of the demand for public water supply - for homes, industry and agriculture. Often, the interests of nature and humans are integrated, but sometimes not.

For most countries, water management responsibilities are separated into logical and manageable geographic areas, which may be based on river basins, geology, geography, or political boundaries.

More advanced water governance programs may already include a component of stakeholder engagement. For example, this is a principle for catchment water management under the European Union's Water Framework Directive, which requires that representatives of all stakeholder groups (nature, people, industry, agriculture) be consulted and their interests considered.

The site should learn about relevant governance institutions. This can include understanding their initiatives, plans, policies, and goals relevant to the catchment. They should also understand how changes are planned and made. A starting point is the water-related organizations with which the site already has contact, such as a municipal water supplier or water resources regulator. An external expert with local knowledge may be able to provide relatively fast and complete advice on the governance status and policies of the region.

The site should document its understanding of the above matters.

The site should understand the potential impact of any intended new plans and policies on its own operations and be prepared for these. Examples of policies with possible impacts requiring forward planning are:

- The water resources of the catchment are judged to be over-allocated. There is a policy to reduce or withdraw some allocations to bring the catchment back into balance.
- There is a plan to significantly increase municipal water supply charges in order to encourage efficiency and raise funds for essential renovation and upgrades of the water supply infrastructure.
- There is a plan to apply stricter limits on the quality of wastewater received by municipal treatment plants, so some businesses will have to install their own pre-treatment facility.
- Plans to increase public investment in water supply will reduce the occurrence of supply interruptions, thus creating a beneficial impact.

Strengthening of water quality and effluent standards.

- Policies that would re-prioritize water allocation to benefit other water users who may be disadvantaged by current arrangements.

1.5.2 Water-related legal and regulatory requirements applicable to the site should be understood and complied with regardless of any stewardship commitment. These will typically include, but not be limited to, standards for:

- Water quality
- Water pricing
- Water volume limits
- WASH requirements
- Wastewater discharge standards
- Environmental regulations to protect water bodies and conservation areas from pollution

It is important to be fully aware of any licenses or permits with regulatory conditions for the site (such as permitted water abstraction rates and wastewater discharge quality).

1.5.3 **The water balance of a catchment** is an assessment of water inflows, throughflows and outflows, and water storage within the water body. It is a similar principle to a site water balance (1.3.2), but on a much larger scale, and likely more complex. This equation must balance (at least approximately), and so is useful for verifying that

water volumes and flows are reliably measured and accounted. The assessment will help to identify when there is increasing **water scarcity**. This will occur when outflows are consistently larger than inflows, so that water storage and availability in the catchment gradually decrease over time.

A water balance is defined in a basic equation:

$$(\text{Water outflow}) = (\text{Water inflow}) + (\text{Change in storage volume})$$

A catchment water balance is most commonly done on a one-year timescale. It may also be appropriate to calculate it for shorter timescales, if there is significant seasonal variability in availability and/or demand.

Surface water catchment water balance parameters:

- Typical water inflows:
 - o Precipitation (rain or snow) – the principal input for most catchments, and often the only significant input
 - o Flow from irrigation canals or other conveyances bringing water from other catchments
 - o Flow from a river. (A standard river basin catchment includes the river's source and tributaries. However, river inflow is relevant when the organization's defined physical scope is only a sub-section of a large river basin).
- Typical outflows:
 - o Where the main river leaves the catchment (to a downstream catchment or the sea)
 - o Water abstractions
 - o Evaporation from open water bodies
 - o Losses from the river bed as recharge to groundwater
- Storage components
 - o The volume of water in the river, lake or reservoir. Where there is flow (rivers and most lakes), it is the volume at a moment in time, not the volume that flows through it.

Groundwater catchment water balance parameters:

- Typical inflows
 - o For a water table aquifer, infiltration of precipitation across most of the catchment
 - o For non-water table aquifers (confined aquifer), infiltration of precipitation at the recharge zone (the limited zone where the geological unit that forms the aquifer is at or near the land surface)
 - o Downward or horizontal infiltration from surface water bodies
 - o Subsurface flow from one aquifer to another
- Typical outflows
 - o Water abstractions from wells and boreholes
 - o Natural outflows to springs
 - o Sub-surface flow to other aquifers or to sea
 - o Effluent flow to river beds (to ensure baseflow during long periods without rain)
 - o Up-flow to groundwater discharge zones (creating, for example, salt pans in desert areas)
- Storage components

- o The total volume of water stored in the pores and fractures in the rock. To calculate, the volume of saturated rock is multiplied by its porosity (the percentage of open pore space to solid rock). For water table aquifers, the water volume will change as the water table level fluctuates.
- o Some geological units contain large cave systems (known as karstic aquifers) which may contain large volumes of water, behaving more like underground rivers.

Other water balance considerations:

- Combining surface water and groundwater
 - o Depending on local conditions, geology and how water is used, a catchment water balance could be based on surface water only, or groundwater only. However, in many cases, it is necessary to combine the two where there is significant surface-groundwater interaction (See 'Catchments' section) or when a site uses, or interacts with, both surface and groundwater.
- Fossil water aquifers. Some aquifers contain fresh water originating from recharge over geologic timescales. These are common in what are now arid areas, such as North Africa and the Middle East. During the last ice age, these regions had much wetter climates. The water contained in such aquifers is considered 'fossil water'. When abstracted, it will not be replenished under present day conditions or within human timescales. Therefore, if water is abstracted, there will be minimal, if any inflows, to balance it, and storage will gradually decline, making this type of source functionally "non-renewable". See the special subject guidance on 'Fossil water and desalination water' (pending).

Water balance considerations for agriculture:

- Soil water. For arable agriculture, a significant component of water storage is in the soil, and therefore needs to be included in the catchment water balance. Non-irrigated crops obtain 100% of their water requirements from soil water. Water from precipitation, run-off (and irrigation when applied) infiltrates the soil where it is absorbed and stored between the soil particles. Not all precipitation is absorbed by the soil. Some of it continues downwards to recharge underlying groundwater. Some larger plants, such as trees may have roots that extend deep enough to tap water directly from the water table.
- Evapotranspiration. Water losses from arable fields consist of transpiration (where water absorbed by the plant eventually transpires from the leaf surfaces), and evaporation, direct from the soil surface, especially in hot dry conditions. Together these are termed 'evapotranspiration' and form a significant component of water outflow in agriculture.

1.5.4 Knowledge of catchment water quality helps an organization to understand any risks it may face, and its own potential to impact on catchment water quality.

Potential risks to the organization are most important where it has its own water sources. For example, an increasing level of salinity or of a specific parameter, such as nitrate, may eventually impact the organization's water quality compliance (e.g. for drinking water or food processing). It could also mean the organization needs to introduce or increase investment in water treatment.

Where an organization is applying chemicals to land (e.g. in agriculture) or has its own wastewater discharge facility, it has the potential to contribute to water quality concerns in the catchment. For example, elevated nitrate (N) and phosphate (P) concentrations in groundwater and surface water are often the result of fertilizer use. High N and P in surface water (from run-off or groundwater out-seepage) can cause eutrophication, whereby the N and P promote excessive growth of algae, leading to oxygen deprivation for native species.

Water abstractions can also impact on aquifer water quality. For example, high rates of pumping can cause saline water to be pulled into an aquifer along coastal areas (saline intrusion), or 'up-coning' of deep saline water from the lower levels of some aquifers.

An initial assessment of catchment water quality will help define a baseline, but also help identify whether the organization may already be contributing to problems.

Water quality data for the catchment may be obtained from various sources. There may already be comprehensive data available, for example from regulators, environment agencies and academic studies. Other stakeholders may also have data to share. Where existing data are limited, the organization should consider collecting its own samples for analysis from a relevant range of locations across the catchment (usually with the support of an expert).

The organization should report on its findings and review the potential risks to and from it. Where appropriate, corresponding actions should be included in the water stewardship plan.

1.5.5 Research should be undertaken to identify Important Water Related Areas (IWRA) and features within the catchment and to define their value. Methods for identifying IWRAs include:

- Existing knowledge
- Consultation with relevant stakeholders, such as environment agencies, conservation NGOs, wildlife groups, fishing clubs, landowners.
- For IWRAs with cultural value, consultation with community and Indigenous peoples' representatives
- Review of maps, both standard geographical maps and specialist maps, such as maps of recognized conservation sites.

Identified IWRAs should be listed, with a description of what they are, their value (environmental, community, cultural), their status and any water-related risks. It is recommended to note them on a catchment map.

Regarding status, it should be reported whether they are in good, poor, deteriorating or improving condition. Specific concerns, such as 'polluted' or 'drying up' should be mentioned.

If feasible, each IWRA should be visited and its current status recorded, for example with a brief description and/or photographs. This establishes a baseline against which to measure change. This is especially important if there is any possibility that the organization could have (or be accused of having) an impact on the IWRA.

See the IWRA specific guidance in this document for more detail.

1.5.6 For organizations relying on municipal water supply, the status of the infrastructure may be a critical risk. If the organization uses only private water sources, the status of catchment infrastructure (for water and wastewater) remains relevant to understanding the water challenges of stakeholders.

The organization is not expected to undertake a detailed study of public supply infrastructure. Instead, it should develop an understanding of the general scale and condition of infrastructure in the catchment. This can usually be achieved through publicly available information and/or consultation with authorities and/or water supply bodies.

Important measures are the percentage of the catchment population with access to safe and sufficient drinking water, and the percentage connected to wastewater collection and treatment services.

In many locations, public water and wastewater infrastructure is decades old, built with obsolete materials and methods, and subject to leaks and failure. It is highly costly to repair and replace. For this reason, many governments and authorities cannot afford a comprehensive upgrade and instead aim to invest just enough to keep ahead of the worst failings. It is important to recognize and acknowledge this limitation.

It is important to be aware if infrastructure is in a particularly poor condition with limited plans for improvement. In this case, a business reliant on public supply will be at increasing risk of supply interruptions and limitations, and at greater risk of contaminated supply.

The most useful information will likely be available from water management and public water supply and wastewater agencies, for whom ownership, maintenance and infrastructure upgrade planning will be part of their responsibilities. Some authorities or supply agencies may be reluctant to share information that could expose weaknesses or problems.

At a minimum, the site should provide a summary of the extent of water infrastructure, its general age and condition and percentage of catchment population served. It should report on any regular problems, on risks and include an overview of policies for upgrade (for example, to meet growing demand) or risk mitigation (for example from extreme events, such as drought). Where information cannot be obtained, an absence of information can present a risk.

1.5.7 This indicator has some overlap with 1.5.6. The organization should identify the percentage of the catchment population with access to good water and wastewater services. It is not required to do its own research, but can usually get the information from other sources, such as government agencies or NGOs.

In developed countries, it is usual for nearly 100% of the population to have access to adequate WASH facilities. In developing countries or in remote areas, provision may be very limited. An absence of municipal infrastructure does not necessarily mean WASH provision is poor, as individual properties may have their own reliable and safe water supply and sanitation systems.

There remain many parts of the world where WASH provision is poor, perhaps due to poverty or poor governance and government investment.

See the WASH guidance for more information.

1.5.8 An organization will normally collect water-related data onsite, especially if it operates its own water sources and/or wastewater treatment facilities. As part of conforming to the Standard, where permitted or practical to do so, the site will also likely collect data beyond its boundaries related to monitoring risk to itself, or its impacts to others. This may include:

- Sampling water quality upstream of its water sources (surface or groundwater)
- Sampling water quality downstream of a wastewater discharge point
- Measuring water levels in offsite monitoring wells in order to monitor the impact of the site's groundwater abstractions.

Joint data collection consists of the mutual sharing of water-related data collected by the site with authorities, other water users or researchers and is encouraged to help others in the catchment on their water stewardship efforts.

A key stewardship action would be for the site to offer to assist the relevant authorities to do their mandated work, for example by undertaking data collection over and above regulatory requirements.

1.5.9 The same approach and guidance applies as for indicator 1.5.7 but for catchments of origin of primary inputs that are not the same as the site's catchment. This indicator is advanced whereas 1.5.7 is core in recognition of the aforementioned complexities of not being in the site's catchment.

1.6 UNDERSTAND CURRENT AND FUTURE SHARED WATER CHALLENGES IN THE CATCHMENT

Shared water challenges are those shared by the site and one or more of its relevant stakeholders (as should be identified in Indicator 1.1). Shared challenges provide an opportunity for collective action in the catchment and to guide the water stewardship plan.

1.6.1 The identified shared challenges should be listed and prioritized in terms of their significance and urgency. Recommendations are not given on how to prioritize due to the very large number of possible circumstances, but reasonable judgements should be made, with justification. For example:

- A concern for complete loss of water supply is more significant than concern for a 10% rise in water charges
- Occasional interruption of water supply experienced now, is more urgent than concern for reduced supply in the future.

Where shared water challenges are identified, it is important to understand their cause, in order to accurately prioritize, to develop appropriate mitigation actions, and to know whether collective action is appropriate. For example:

- What is the cause of a decline in water levels in a borehole? It could be due to (i) high extraction by nearby users, (ii) a general decline in water levels across the catchment, or (iii) because the borehole is becoming clogged. The first two can be addressed by collective action, the third, not as likely.

As a starting point, it is important to first be aware of any existing public sector efforts or plans to address them so as to avoid duplication or conflicting actions.

1.6.2 Initiatives should be related to and consistent with the findings of 1.6.1.

1.6.3 Predicting future issues is difficult and introduces uncertainties. However, there are factors which can point to potential concerns in the future. This first requires an assessment of existing trends that could impact on water resources, examples include:

- Growing population
- Increasing development of water-using industry or agriculture
- Increasing water demand by existing population, industry or agriculture
- Observed climate trends (e.g. reduced rainfall or higher temperatures)
- Worsening water quality of important water bodies
- Deteriorating condition of water-related infrastructure

Experts and expert information sources can advise on projected trends not yet observable.

Once trends and projected future issues are identified, a review should be undertaken of the impacts these may have on the organization, catchment population and natural environment.

1.6.4 The development of a Social Impact Assessment (SIA) or Environmental and Social Impact Assessment (ESIA) may be a mandatory component of the site's authorisation for development and operation. Where this is not mandatory, or where it does not address water impacts, then an additional assessment of water-related social impacts is valuable and will help a site to better understand the risks it presents to others, and their mitigation.

Examples of water-related social impacts, which may be positive or negative, include:

- The site's water use is restricting the availability of water to local communities and/or small farmers
- The site's wastewater discharge presents a water quality risk to downstream water users
- The site's irrigation activities have a positive impact on nearby farmers, whereby excess water is helping to wet their soils and recharge aquifers
- The site's proactive programmes on data collection and addressing shared challenges are providing a net benefit to the community
- Impacting cultural or community value

The site should undertake an assessment of its impacts (positive and negative) and plan action as appropriate. For negative impacts, it should develop a plan to remove or mitigate them. For positive impacts, it may wish to communicate this with stakeholders, for both reputation and to set a good example to others.

The site should provide documentation on its assessment and associated plans.

1.7 UNDERSTAND THE SITE'S WATER RISKS AND OPPORTUNITIES

Understanding water risks to the site is one of the most important parts of the business case for water stewardship.

By understanding the risks, and then acting to remove, reduce or mitigate them, a site will help protect itself from unexpected costs and impacts. It is also important for ensuring business continuity and protecting the employment of site workers.

The findings of this criterion will be mostly based on the information gathering and research of the previous criteria in Step 1. Also, criteria 1.6 and 1.7 are related and are somewhat iterative. In other words, understanding risks and opportunities can inform water-related challenges, and identifying challenges informs about risks and opportunities.

1.7.1 There are three main types of risk to an organization: physical, regulatory and reputational. Given the complex and diverse nature of risk, it is recommended to seek expert support.

Examples of water-related risk include:

Physical risks for municipal supply

- Sudden infrastructure failure, such as breaks or leaks, leading to interruption of supply
- Increasing charges
- Contamination outbreak in supply (e.g. from pollution in reservoir, or leaky pipework)
- Regular supply interruptions (more common in developing countries with under-investment in water infrastructure)
- Vulnerability to extreme natural events (e.g. earthquake, freezing pipes and breakages due to extreme cold)
- Drought restrictions

Physical risks for private supply

- Failed water sources, through poor condition and poor maintenance
- Restrictions on permitted abstractions during dry seasons or drought
- Pollution of the main water body (surface water or aquifer)
- Direct contamination of water source
- Failure of water treatment system

Regulatory risks

- Breaching conditions of abstraction permits, such as over-abstraction
- Causing pollution of water bodies
- Failing quality conditions of wastewater discharge permit

Reputational risks

- Public awareness of any regulatory breach
- Real or perceived cause of negative impacts on other water users and/or the natural water environment
- Perception that the site uses too much water adversely impacts the “social license to operate”

1.7.2 Water stewardship is intended to be positive and constructive. It is equally as important to identify and benefit from opportunities as it is about mitigating risks. Examples of water-related opportunities include:

- Reducing water-related risk boosts the sustainability of the business, protects jobs, and increases the confidence of customers and investors, which can improve market share and position.
- Reducing water use will probably provide costs savings (although these may not be significant due to the typically low cost of water supply and abstraction permits). For irrigated agriculture, the greater cost savings is often in the energy used for pumping.
- Addressing shared water challenges will help achieve long term security of water needs for the site and its stakeholders across the catchment and enhance stakeholder relationships.

- Pre-treatment of wastewater by a factory may save on municipal charges and provide cleaner wastewater that can be re-purposed.
- A site with its own wastewater treatment system could potentially sell the service to other nearby industries.

Any positive impacts in the catchment and with stakeholders will likely create positive reputational benefits.

The prioritization of risks can be based on an analysis of cost to address, relative impact (magnitude, frequency, severity). Risks can also be prioritized based on stakeholder input and information gleaned for existing sources, such as the World Resources Institute Aqueduct tool (<https://www.wri.org/aqueduct>).

1.8 UNDERSTAND BEST PRACTICE TOWARDS ACHIEVING AWS OUTCOMES

The topic of best practices can be confusing and contentious. For this Standard, it is recognized that to be globally applicable to all sectors and types of organizations, there needs to be flexibility and allowances for what constitutes best practice. As defined in the Glossary, this Standard defines best practices as a range of possibilities.

A best practice can be new or innovative compared to standard practice but is not required to be. In some cases, a standard and established practice may be the best practice. Not all issues or challenges have well defined, globally agreed to practices which all interested parties would agree are “best practices”. Therefore, best practices can be situation-specific and defined by a variety of methods such as regulatory, scientific, and stakeholder input. A subset of best practice is known as “Best Available Technology” which means a method, technique or procedure that has been shown by research and experience to produce optimal results, and that is established or proposed as being suitable for widespread adoption.

1.8.1 Examples of best practice in water governance by the AWS implementer:

- Public disclosure of water use and water quality data for others to use
- A comprehensive water stewardship plan that is well-implemented, routinely reviewed and updated
- Engaging with peer organizations and stakeholders to promote water stewardship
- Demonstrating support for good water governance and stewardship with appropriate authorities, including establishing or participating in Public-Private Partnerships
- Facilitating or contributing to multi-stakeholder governance platforms
- Advocating for integrated water governance at the catchment level, including supporting coordination among relevant institutions

1.8.2 Many industry sectors now have guidance on how to improve water balance through efficiency, management, and net reduction of consumptive use. The organization should research what guidance is available for its sector.

There is a difference between water efficiency and reduced net consumptive use. The Standard allows for water balance concerns to be dealt with via efficiency improvement. However, the long-term expectation, especially in places where water scarcity is a shared challenge, is to reduce the total volume of water used. Where this reduction is not possible or practical, improvements in efficiency result in less water used per unit of production or some other applicable metric. This is particularly important in situations where a site is expanding or adding product lines and without improvements in efficiency, it would consume even more water than it currently does.

One attractive best practice is for sites to develop projects where they replenish water elsewhere in the catchment to offset site water consumption. This allows for the site operations to use the volume it needs, but overall the site is still improving the catchment water balance. Such projects need not be related to site operations. For example, a site can work with other groups in the catchment on a project such as stormwater capture or municipal water reuse. It is highly recommended that sites consider such catchment replenishment projects before determining there is no option other than efficiency improvements to address water balance concerns.

Examples of best practice for water efficiency:

- Undertake a detailed study on how water is used in the organization, when and what for (as an extension of the water balance assessment of 1.3.2). This will help to prioritize where to focus water efficiency efforts or installation of water efficient technology.
- Train workers on how to improve efficiency in the work they do, and on basic daily activities, such as switching off taps.
- Undertake a leak detection and measurement assessment, followed up by actions to reduce leaks.
- Install water efficient fittings, for example for toilets, wash rooms, equipment washing facilities, etc.
- For irrigation, improve scheduling (such as not irrigating at times of rainfall, match to soil and crop needs, and irrigate at dawn/dusk/night to reduce evaporation losses) and install water efficient systems, such as drip technology.
- Switch to types or species of crop that require less water for healthy growth and are suitable for the region's climate.
- Aim to use the most sustainable water source(s) and water bodies available
- Apply best practices on water efficiency. If it is not clear what these are, then stakeholder engagement may help to identify what is most appropriate for the catchment.

1.8.3 Water quality can be applicable to incoming water, but also to outgoing wastewater. Examples of best practice on water quality include:

- Match water quality to its intended purpose. For example, some industrial uses do not require drinking water quality water. Using a lower quality water can reserve higher quality water for essential purposes, and can result in savings on water treatment costs, and associated chemicals and energy requirements.
- In agriculture, select crops may be suited to the available water supply without the need for treatment. For example, some crops can tolerate mildly brackish water (for example, 2000 mg/l of dissolved solids).
- Use wetland treatment systems to fully or partially treat wastewater. This can have a range of benefits, including reducing energy use, and creating a benefit for species diversity and attractive green/blue spaces.
- Apply a 'water safety plan' approach to protect high quality water bodies and aquifers. This means using appropriate land management practices to protect water bodies from pollution in the first place, so ultimate water users (e.g. water service providers) can rely less on water treatments.

1.8.4 This indicator applies to both onsite and offsite (but within site catchment) IWRA's. It is possible the best practice for an onsite IWRA will differ from an IWRA that is outside of the site.

For IWRA's, best practice is highly dependent on what it is. Examples include:

- For a surface water IWRA adjacent to agriculture, establish buffer strips between fields and the feature, so as to protect it from polluting run-off.
- Establish wetland treatment systems to protect an IWRA from the run-off from roads and parking areas.
- Establish a regular monitoring program to observe any changes to or impacts on an IWRA.
- Install a monitoring borehole between the operational site and IWRA as an 'early warning' approach to detect any influences from the site (e.g. on water levels or quality) that could impact the IWRA.
- Support a project (either directly or via an NGO) to restore and improve an IWRA that has suffered in the past.
- Support public communication initiatives (such as sign boards) to raise awareness of an IWRA and discourage actions by others that could damage it.

1.8.5 This indicator relates to the catchment, which includes the site. However, provision of WASH is a core indicator for onsite, and advanced for offsite efforts. Therefore, offsite best practices would apply only if the implementer opts to conform to the advanced level (as addressed in 3.6 and 3.9).

The significance of this indicator is dependent of the findings of 1.5.7 (the adequacy of available WASH services within the catchment).

In a developed country with very high rates for the provision of water supply and wastewater services, there may be little scope to provide any additional initiatives or benefits.

Examples of best practice for on-site WASH provision:

- Provision of sufficient supplies of safe drinking water for all workers, considering increased needs in hot weather.
- Provision of sufficient and high standard facilities for toilets and washrooms for men and women, and any other relevant needs, such as for disabilities, age and religion.
- Provision of showers for workers who may not have adequate provision in their own homes.
- Provide training for workers and their families on good hygiene practices, within their community if appropriate.

STEP 2: COMMIT AND PLAN

GENERAL GUIDANCE FOR STEP 2

A commitment by senior management is essential to ensuring an organization has the motivation for water stewardship and has the intention to provide the investments, in time, money and human resources to commence, complete and continue the water stewardship journey. External disclosure will help to ensure that the organization remains committed, in part to protect its reputation and credibility. Internal disclosure will help establish water stewardship within the organization's culture and send a message to all workers on its importance.

The water stewardship journey will typically take a number of years to achieve full conformance and/or certification. Once achieved, it should remain a long-term activity and commitment. This means planning is essential to prepare for the necessary financial and time commitments. The first aspect is to plan for implementing water stewardship. The second and longer-term aspect is to create a more permanent Water Stewardship Plan, but one that will develop and evolve over time.

2.2 COMMIT TO WATER STEWARDSHIP

2.1.1 The person signing the commitment should be someone in a position to grant and guarantee the necessary human and financial resources to achieve the organization's status as a water steward, and to maintain it in the long term, including the principle of continuous improvement.

In the event that the individual is replaced by another in the same or similar position of responsibility, the new person should reconfirm their commitment by also signing.

2.1.2 Commitment from the senior executive, with public disclosure, further increases the credibility of the commitment, and helps to lock it in as part of the long-term corporate strategy.

2.2 DEVELOP AND DOCUMENT A PROCESS TO ACHIEVE AND MAINTAIN LEGAL AND REGULATORY COMPLIANCE

2.2.1 The requirement to gather knowledge on water-related legal and regulatory requirements is addressed in Indicator 1.5.2.

The site should demonstrate its processes and procedures for itemizing relevant regulations, summarizing the compliance requirements and obligations, details of how to comply, and having a record of submissions to the relevant agencies. The system should also record any non-compliance warnings or events, including fines, and report on corrective actions. Where a documentation system already exists, this may be referenced. With regard to the responsible person, this should refer to the job title as the individual may change.

Regulators will define the information they require to different levels of detail. Some may be detailed and specific, for example, specifying precise water quality parameters to report or with reference to relevant water quality regulations. Others may be more flexible, for example requiring a report on 'water quality' or requiring a demonstration that water is potable. In this case, the organization should reference appropriate standards, whether local, national or accepted international standards, such as the WHO Drinking Water Guidelines.

Similar principles apply to other compliance requirements, such as water withdrawal limits and wastewater discharge standards.

2.3 CREATE A WATER STEWARDSHIP STRATEGY AND PLAN

In creating the plan, the organization is expected to use the information gathered in Step 1 and supported by the leadership commitment and provision of resources called for in 2.1, to lay out a plan to achieve goals towards addressing the challenges, and risks, and opportunities identified.

2.3.1 The difference between strategy and plan is the degree of detail. They are distinct documents but can be combined. The strategy is at the level of vision and mission around stewardship, with overarching goals.

2.3.2 The plan details the targets associated with goals (defined in the strategy), and specifics as defined in the Standard. AWS recommends that the plan be structured around the five AWS outcomes.

The water stewardship plan should address risks, shared challenges and opportunities, preliminarily identified under Step 1, and include due consideration of the five AWS Outcomes. With regard to risk, there are three general categories of water-related risk to consider:

1. Risks to the site and its water supply
2. Risks from the site to other water users and the natural environment
3. Risks related to shared water challenges (which may overlap with the first two categories)

Actions should align with the following principles:

- Be prioritized according to the urgency and level of risk, through consultation with selected stakeholders, taking into account their interests and concerns.
- Be linked to targets or objectives that are SMART: Specific, Measurable, Achievable, Realistic, and Time-based.
- The scope and cost should be appropriate and proportionate to the urgency and level of risk.
- Define who is accountable for what. A useful approach is to identify who is: Accountable, Responsible, Consulted and Informed (the ARCI approach). Positions rather than names are usually most appropriate, given that individuals may change.

There are two principal categories of action:

- Immediate action to address an urgent problem, a high risk issue or to capitalize on an opportunity
- Long-term action to provide ongoing protection against risk or to achieve an improvement of status via opportunities over time

One convenient way to summarize the plan is to use a tabular form, with supporting documentation as appropriate. However documented, it should cover: target; measurement and monitoring method; actions; timeframe; budget; and responsible persons. Where possible, the links between a target and achievement of best practice should be shown.

2.3.3 The organization is encouraged to promote increased uptake of water stewardship through partnership with other sites that may or may not be under the same company or organization. This is particularly relevant to addressing shared water challenges. Examples include:

- Working in partnership to reduce net water abstractions from within the catchment
- Cooperating on the restoration and protection of an IWRA
- Working together to reduce pollution discharges to water bodies, such as from fertilisers and pesticides.

- Where there is no strong case for physical actions, the site may work with others to communicate on water stewardship principles.

AWS does not require that such actions are undertaken where there is not a strong case for it, but expects the site to assess the need and potential, and to report on those that are undertaken.

2.3.4 The guidance is the same as for 2.3.3, but for situations when actions take place in more than one catchment. It is recognized that actions outside of the site's catchment may be more difficult or not possible relative to the examples in 2.3.3.

2.3.5 To show it has sought consensus, the organization should report on how it has engaged with relevant stakeholders and communicated its water stewardship plan to them. It should also show, where relevant, that the plan has considered the interests and concerns of stakeholders. Typically, consultation will be undertaken within the context of stakeholder engagement (See Guidance section on Stakeholder Engagement).

2.4 DEMONSTRATE THE SITE'S RESPONSIVENESS AND RESILIENCE TO RESPOND TO WATER RISKS

A major part of the plan defined in Step 2 is how the site will take actions. However, the plan should also explain how the site is ready to respond to issues as appropriate.

2.4.1 This indicator is additional to the requirements highlighted in Criteria 1.7 (understanding the site's water risks and opportunities). This indicator applies mainly to how the site will plan to address external risks outside of the site's direct control or responsibility, and particularly for those risks associated with dependence on public infrastructure. This indicator also acknowledges that not all risks are associated with emergencies. For example, risks with this indicator include but are not limited to:

- For municipal water supply, risks to the distribution infrastructure, flood risk from storms, surface water or the sea level rise.
- For water sources (whether private or owned by an external supplier), risks to the water body from which they abstract (surface or groundwater). This may be water levels, flows, pollution events or decreasing water quality trends

This indicator relies on engaging with external water suppliers and managers, who should already have been identified as relevant stakeholders.

Risk mitigation refers to reducing the likelihood of an event occurring or reducing exposure to it. Risk adaption assumes mitigation is not feasible and that the site should be better prepared for the impacts.

Engagement with public sector and infrastructure agencies can be an effective means to identify such risks. They may already have undertaken risk assessments to support their own business management, but they may not have openly communicated them. This engagement can also help make the relevant public sector more aware of the site's own needs and concerns regarding its water and wastewater services.

The information for this indicator can be combined with that of 1.7 and be a component of the Water Stewardship Plan.

2.4.2 Climate scientists project that climate change is increasing or will increase water-related risks. The type and level of projected change varies from place to place, often with a high level of uncertainty. Impacts may be linked to too much or too little water, such as increased flood risk or less rainfall. Projections suggest that such events will become more frequent and potentially more intense. This means water-related infrastructure at the site, and within the catchment, could be at greater risk than it is currently designed to manage. The site and catchment may also become more vulnerable to water scarcity.

Given the complexities and uncertainties around climate change projections, the organization should undertake its assessment in coordination with relevant public-sector agencies, and other expert sources. For example, the organization can take into consideration climate science and analysis, particularly if referring to the catchment.

The outcome of the assessment may be incorporated into the original water stewardship plan or be provided as an addendum. In any case, risk management actions and emergency response plans should be adapted accordingly.

STEP 3: IMPLEMENT

GENERAL GUIDANCE TO STEP 3

Step 3 is the part where the organization implements the plan they developed in Step 2, using the information gathered in Step 1. The Criteria and Indicators associated with this Step focus on demonstrating that the plan is being implemented effectively. The actual site and catchment impact resulting from the plan implementation is addressed in Step 4: Evaluate. This distinction is important because even a well implemented plan may still not result in the desired improvement in the catchment. This would not necessarily be due to poor implementation, but instead may be due to a misunderstanding of information gathered or an issue due to missing information. The Guidance provides examples below of what the site could implement and document to demonstrate conformance with the criteria. However, the specific actions will be in line with what was planned in Step 2.

When the plan is properly implemented as demonstrated by Step 3, but the impact results noted in Step 4 are not as desired, the site needs to assess the plan in the spirit of continual improvement to address the discrepancy.

The organization should provide appropriate evidence that it is implementing its water stewardship plan as defined in Step 2. Documentation may be in paper or electronic form according to the organization's own convention, provided these are accessible to auditors.

The key to effective implementation is clear instructions, processes, and procedures; clearly defined roles and responsibilities; robust training and awareness; and effective monitoring and measurement.

3.1 IMPLEMENT PLAN TO PARTICIPATE POSITIVELY IN CATCHMENT GOVERNANCE

3.1.1 The organization should describe how it has supported or contributed to good catchment governance. For example, it may have engaged with relevant authorities and can demonstrate support for improved water governance and water management policies.

3.1.2 This indicator refers to water rights not already covered by legal and regulatory mechanisms as captured in 3.2.2. Information on such rights may come from local governance groups or other stakeholders. Recognizing that some rights are not in such requirements, but are still relevant, they are captured in this indicator regarding governance. One possible source of this information could be local indigenous groups or organizations.

Additional guidance on the respect of human rights is given in the UN Guidance Principles on Business and Human Rights (2011), however it is important to note that the scope of the AWS Standard is focused on water-related rights.

Where stakeholders have rights to the water resource, such as some local communities and indigenous peoples with traditional rights, their informed consent should be given in order to use the resource. Where these rights are not formally recognized by a government regulator, there remains a duty to identify and respect them where they exist. Engaging with such communities requires a long-term commitment to achieve meaningful dialogue and build trust between parties.

3.1.3 The organization should report on how it has improved its internal water governance capacity, for example, through giving greater responsibility and time to water stewardship for existing employees and/or appointing additional dedicated staff.

In addition to its water stewardship plan and records (as required for the AWS Standard), it may also have created additional internal policies, guidance and standards documents.

3.1.4 To show it has sought consensus, the organization should report on how it has engaged with relevant stakeholders and communicated its water governance approach and water stewardship initiatives. Where relevant, the site should show where its approach has considered the interests and concerns of stakeholders. Typically, consultation will be undertaken within the context of stakeholder engagement (See Guidance section on Stakeholder Engagement).

3.2 IMPLEMENT SYSTEM TO COMPLY WITH WATER-RELATED LEGAL AND REGULATORY REQUIREMENTS AND RESPECT WATER RIGHTS

Knowledge of regulatory and water rights is addressed in Indicator 1.5.2.

3.2.1 The organization should provide, or reference, the documentation demonstrating legal compliance and provide documentation of any violations or corrective actions taken to address violations. Documentation may be in the form of authorizations, auditor records, compliance submissions, etc. Sites may reference documentation already gathered by regulatory bodies where appropriate, provided they are accessible to the auditor for verification.

3.2.2 See guidance for 3.1.2. The difference between 3.1.2 and 3.2.2 is that 3.2.2 specifically refers to rights captured in legal and regulatory requirements.

3.3 IMPLEMENT PLAN TO ACHIEVE SITE WATER BALANCE TARGETS

3.3.1 and 3.3.2 For targets defined in Step 2, the organization should show what the targets are and how it has progressed towards them in a format that is clear and appropriate. This would include results from catchment water replenishment projects. Where targets are not met or approached, then justification should be given.

3.3.3 Where the organization re-allocates water savings for external benefits or uses, then it should demonstrate this action is legally compliant and has appropriate regulatory approval, where applicable. The organization should take such actions in consultation with catchment authorities and key stakeholders. It is also understood that in some cases, the organization may have no mechanism, legal or otherwise, to reallocate water.

An organization may make such re-allocations where water savings are beyond what is required to achieve a sustainable water balance. Re-allocations may benefit environmental, cultural and social needs in the catchment. Legal compliance is required to ensure approval and to avoid liabilities (black water events). This is particularly important for water supplied for human use, but also for water bodies containing important biodiversity and cultural values, for which water quality is critical. There should also be confidence that re-allocated water does not create a risk of flooding, erosion or other damage or to third parties. Whatever the purpose, the organization must be confident the water quality is safe and compliant for the intended use and should include water treatment if necessary to achieve this.

Examples include:

- Transferring saved water to a sensitive IWRA, such as a biologically important wetland
- Providing a drinking water supply to a small local community
- Providing irrigation water to subsistence farmers
- Aquifer recharge
- Offering water to Indigenous groups disadvantaged by water markets.

3.3.4 In some cases, the site may not be legally compelled to re-allocate saved water, but may wish to do so for social, cultural, or environmental needs. The organization may use any method of quantification it considers appropriate.

3.4 IMPLEMENT PLAN TO ACHIEVE SITE WATER QUALITY TARGETS

For targets defined in Step 2, the organization should show what the targets are and how it has progressed towards them in a format that is clear and appropriate.

3.4.1 For each water quality target, the evidence should show: the water body or feature it applies to, the target water quality and planned timescale to achieve it. The organization should show how it is progressing against this plan. Where it is not progressing at the planned rate, the organization should provide an explanation of why it thinks it is not achieving this, and appropriate corrective action to do so.

3.4.2 As a minimum, effluent quality should be legally compliant. Best practice will mean ensuring it is of the highest quality feasible (beyond compliance), especially for regions where wastewater regulations are weak or non-existent. Where water quality is a shared challenge, then the quality concern should be identified (e.g. elevated levels of a particular chemical) and this taken into account in treatment and discharge location.

3.5 IMPLEMENT PLAN TO MAINTAIN OR IMPROVE THE SITE'S AND/OR CATCHMENT'S IMPORTANT WATER RELATED AREAS

3.5.1 The plan is defined according to Criterion 2.3. Where no IWRA is identified, no action is required.

Because of possible unique situations where the best that can be done is to prevent further degradation, maintaining the IWRA may be the only suitable solution for this requirement, however this should be considered a last resort.

Where an IWRA is to be restored or improved, the organization should have a record of its status prior to interventions. Depending on what the feature is, this may include a biodiversity study, water level and/or flow data, water quality data, etc. This then forms the benchmark against which to monitor improvements. If the target is to conserve (assuming it is already in good status), then similar information can be used to demonstrate it remains in a good condition, and to highlight any negative changes in its condition – which of course, will require corrective action. Photographs and videos can also be valuable in showing condition and change.

3.5.2 The same guidance applies as for 3.5.1, except this advanced indicator requires completed restoration.

3.5.3 The organization should show it has informed relevant stakeholders of its work on IWRAs and has requested feedback from them, which will ideally confirm their support. Where stakeholders have raised any objections or concerns, these should be recorded and considered as appropriate. In recognition the site cannot insist on feedback, as a minimum, it should show it has invited it.

An example of an objection to restoration of an IWRA:

- Restoring a wetland will result in raising water levels by an unacceptable amount. This will also raise surrounding groundwater levels which creates a risk of flooding in the basements of nearby properties.

3.6 IMPLEMENT PLAN TO PROVIDE ACCESS TO SAFE DRINKING WATER, EFFECTIVE SANITATION AND PROTECTIVE HYGIENE (WASH) FOR ALL WORKERS

3.6.1 The site is recommended to evaluate the water-related data collected on WASH provision at the site by defining SMART monitoring indicators which should enable the site to determine any particular gap in access or adequacy in comparison of some independent standards and guidelines and considering internal inputs from the workforce. The site should provide a description of and quantify any additional measures implemented to improve the level of access and adequacy of WASH at the site, developed as a result of the assessment completed under Indicator 1.3.8. This should take equitable account of gender needs, and any other special needs and includes, but is not limited to, improvement in access and adequate provision of drinking water, toilets, washing facilities, hygienic areas for food and drink consumption, and potentially showers.

3.6.2 Examples of where an organization could impinge on the human right to safe water and sanitation of communities:

- Negative impacts on community water supplies such as pollution or excessive abstractions with no net loss to water supply.
- Land developments or exclusions that prevent Indigenous peoples from freely accessing their traditional water sources.
- The costs associated with providing access to safe drinking water should not outweigh the human right

3.6.3 Report on any actions and investments by the organization to provide and improve WASH facilities in the community. This indicator is intended to capture efforts by the site directly to improve WASH provision beyond the site boundaries. Examples include:

- Providing publicly accessible drinking water access (e.g. tap, fountain) outside the site boundary diverted from the site's own water supply. This is a valuable benefit in locations where municipal water supply is limited or non-existent.
- Installing water sources, treatment and drinking water access and/or wastewater treatment facilities in local communities

3.6.4 Where local communities have poor access to WASH, there can be significant potential for an organization to support and provide new facilities, whether independently, with peer organizations or the authorities. Where local communities are a source of employees, such provision can help improve the health and wellbeing directly of its own workers and their families. This indicator calls for the site to share information and advocate for change, and there is no expectation that the site is required to construct and maintain infrastructure to provide WASH in the catchment outside of the site.

3.7 IMPLEMENT PLAN TO MAINTAIN OR IMPROVE INDIRECT WATER USE WITHIN THE CATCHMENT

3.7.1 Options for reducing indirect water use include:

- Switch to a different service or product supplier that is known to use less water to provide the same level, quantity, and quality of primary inputs.
- Engage with existing suppliers to encourage them to improve their practices.

It is important to ensure that choices about switching suppliers are based on measurable water use data and not on theory or modelling. For example, water footprint assessments are a means to raise awareness about how much water is typically used for a product or food item but may be unreliable for a specific case. A water footprint assessment of how much water is used to grow a certain crop in a certain region of the world relies on general data for that region and does not take account of water efficiency practice on individual farms. Any choices that can have an economic impact on a supplier should be based on verifiable data.

3.7.2 Achieving a reduction in indirect water use will often require engagement with suppliers to understand how they use water, and encouragement for them to modify their practices so as to make savings. Suppliers may do this directly, or they may rely on support from the organization.

In fact, many of the actions the organization applies itself as a water steward could be relevant. Once the organization has achieved good water stewardship status, it is in a stronger position to advise its suppliers, and demonstrate to them the advantages and benefits, such as reduction of risks and costs.

3.7.3 This indicator covers potentially a very wide range of issues and actions. Examples include:

- Supporting efficient irrigation projects for crops in a site's supply chain
- Supporting actions to reduce water pollution originating from the production of an item in the supply chain. For example, leather tanning is known to be a significant source of water pollution.

3.8 IMPLEMENT PLAN TO ENGAGE WITH AND NOTIFY THE OWNERS OF ANY SHARED WATER-RELATED INFRASTRUCTURE

3.8.1 The intent of the engagement is to address common risks, in part as defined in 2.4.

3.9 IMPLEMENT ACTIONS TO ACHIEVE BEST PRACTICE TOWARDS AWS OUTCOMES

This criterion regards the progress towards implementing and achieving best practices. In the spirit of continual improvement, core indicators [3.9.1](#) to [3.9.5](#) address actions towards achieving best practice implementation, realizing there will be some elapsed time before full implementation is realized. This is to avoid the site being considered non-conformant with the Standard in that time period. AWS is preparing a compendium of best practices towards the five outcomes that will provide further guidance for criterion 3.9.

Examples of best practice for each of these subject areas are given for indicators 1.8.1 to 1.8.5.

[3.9.1](#) to [3.9.5](#) Relate to implementation of actions towards achieving best practice.

[3.9.6](#) to [3.9.10](#) Relate to demonstrating achievement of implemented best practices (quantified where applicable).

[3.9.11](#) Is intended to document the effort that the site has undertaken to promote best practices uptake by others beyond the site.

[3.9.12](#) Is intended to provide a list of actual collective actions taken by the site.

[3.9.13](#) This indicator then assesses the improvement, as validated by involved stakeholders, resulting from the collective action effort noted in [3.9.12](#). For example, if an improvement action on an IWRA was taken through collective action, the site would have quantified evidence of positive impact(s) to the IWRA and evidence from stakeholders that the site did indeed play a role in the collective action.

STEP 4: EVALUATE

GENERAL GUIDANCE FOR STEP 4

It is important for a water steward to periodically review its performance and progress. This includes assessing its contributions and benefits to water management, as well as how risk exposure has changed for the organization and its stakeholders. Evaluation forms the basis of determining which new actions or approaches are required and what they should be. This may require an update to the water stewardship and incident response plans from time-to-time and will support the principle of continuous improvement.

Criteria and Indicators in Step 4 differ from those in Step 3 because in this step, we are evaluating the resulting impact from the site's plan on the site itself as well as its catchment, and where applicable, the impact of primary inputs on their catchments of origin.

4.1 EVALUATE THE SITE'S PERFORMANCE

[4.1.1](#) The organization should list the targets for action and improvement from its water stewardship plan, and report on to what extent they are being, or have been met. It should also report on how it has contributed to achieving each of the five AWS Outcomes. The rate at which targets are achieved should be compared with timelines given in the water stewardship plan.

[4.1.2](#) This indicator refers to value creation for the implementing organisation. The organization should aim to provide a financial water cost-benefit component and report on its financial investment in water stewardship and the services and benefits achieved. For example, improved water efficiency will result in some costs savings, such as on water supply fees or reduced energy costs (for pumping boreholes).

There may be a net cost to the benefit of reducing risk (and avoiding unexpected higher costs), to achieving longer term water security.

[4.1.3](#) Where identified, the organization should report on the value benefit to the catchment and/or catchment stakeholders, preferably with quantified contributions. This may be a financial benefit, but it may also be a value

benefit such as improved natural capital and ecosystem services or improved long term water security across the catchment and reduced risks.

Evaluating quantitatively the water-related value generated by the site to the benefit of the catchment may pose challenges in some cases and often it may be only possible to give a qualitative assessment.

Examples include:

- Free provision of water or treated waste water for general water supply or irrigation
- Improving water quality of a water body through improved wastewater treatment or installation of wetland treatment system;
- Helping to improve an IWRA feature and providing social and natural capital benefits to nature and communities (e.g. for recreation and wellbeing).

4.1.4 The organization should undertake and report on a senior management or executive level review of its water stewardship policies and plan. This should be by senior managers (perhaps at board level) who are not involved in day-to-day water management or stewardship.

The executive team is the senior-most individuals within the organization. The preference is that this review occurs with the chief executive officer (or equivalent), chief financial officer (or equivalent) or chief operations officer (or equivalent). In all cases, however, a relevant member of the executive team should be the one to perform the review.

Alternatively, the overarching governance body, typically a board (or equivalent), may perform the review. If no board exists, the equivalent governance body should be consulted (e.g. trustee council). AWS encourages the site to engage in a comprehensive discussion of water stewardship efforts, but at a minimum the following should be discussed:

- Shared water challenges (as identified in 1.6 and confirmed in 4.3 and 4.4)
- Water risks (as identified in 1.7 and confirmed in 4.1)
- Water-related opportunities, cost savings and benefits (as identified in 1.6 or 1.7 and confirmed in 4.1)
- And, if relevant, material water-related incidents or extreme events (4.2)

The site should provide a copy of the agenda from the meeting at which the site's water stewardship efforts (including shared water challenges, water risks and opportunities, any water-related cost savings or benefits realized, and material incidents) were discussed. Accordingly, an agenda with such components, along with a list of those in attendance, is necessary. The review should be an annually written document that addresses items raised for concern in terms of performance.

4.2 EVALUATE THE IMPACTS OF WATER-RELATED EMERGENCY INCIDENTS

4.2.1 The organization should report at least annually on any significant or emergency water-related events, its response, actions and outcome. It should aim to understand the cause of events, and where appropriate, implement new actions or modify its water stewardship plan. This includes events that impact on the organization and events arising from the organization or its site that impact on others in the catchment. Such a review may be performed as part of a larger review (of all emergency incidents), so long as the water-related aspects are identified and documented as above.

Incidents can include environmentally based emergencies (which may or may not be extreme events, and may or may not be anthropogenic):

- Floods – mild to severe – that may affect the flow regime and infrastructure capabilities, including storm water management
- Natural disasters that have disrupted the water infrastructure (e.g. tornado, hurricane, earthquake)
- Droughts that have seriously affected water availability and concentrations of contaminants in effluent
- Environmental shifts in water quality (e.g. algal blooms)

- Freshwater invasive species

Incidents may also include accidental or other external situations:

- Contaminant spills or leakages that require abatement
- Structural failures of equipment
- Political conflicts (e.g. war)
- Human error
- Vandalism/terrorism

Extreme events, including those from neighbouring catchments, that have occurred in the past 10-20 years should also be considered relevant as they may indicate potential future climate-related water risk for the site. Extreme weather events and extreme climate events are most easily noted through media stories but may also be found through academic research, which sometimes compiles such information. Public sector agencies may, in certain jurisdictions, offer resources in terms of both tracking such events and evaluating their impacts and risks. Lastly, non-governmental organizations also have tools and often generate reports that speak to the trends in a given location. All these groups should be explored to see whether extreme event information is available for evaluation.

The site should prepare a written annual review of the year's emergency incident(s) with particular attention to the site's response to the incident(s). Any proposed measures to mitigate against future incidents should be included in Criterion 4.4. The site should either provide the previous and updated copies of the water stewardship and incident response plans or highlight the changes made to the water stewardship and incident response plans.

4.3 EVALUATE STAKEHOLDERS' CONSULTATION FEEDBACK

Stakeholders are an important source of feedback and can often provide sites with advanced warning of concerns before they manifest as more serious risks. As a result, stakeholders' consultation on performance not only gives an "early warning system" if there are potential water-related conflicts emerging, but also helps build trust and relationships in the cases where conflict does arise. Furthermore, stakeholder feedback on performance may in fact lead to insight and enhancement of operations, as well as ideas for collaboration and mutual benefits.

Thus, there is a variety of potential forms of communication and feedback. This could be through physical meetings face to face, letters, brochures, or electronic communication. The organization should report on the communications undertaken, and to which stakeholders and interest groups they pertain. As much as feasible, it should also report on feedback (considering any legal data sharing and confidentiality issues). AWS recognizes the organization cannot insist on feedback from its stakeholders. Where feedback is difficult to gain, the organization should show an absence of serious objections and that the interests of vulnerable stakeholders are not negatively impacted.

4.3.1 The organization should report on its consultation efforts, the means of communication, and any feedback. The site should engage stakeholders at least once every year to review its water stewardship performance and provide written commentary from identified stakeholders on the site's performance. This consultation is a good opportunity to confirm shared water challenges and Important Water-Related Areas in the catchment. The form of the consultation should be appropriate for the local context and the stakeholders engaged but does not need to be conducted in person. Note that this may be a rather "informal" consultation. More elaborate and formal engagements are recognized as well. This is also a chance to further gather input for the renewed water stewardship plan.

4.3.2 Because stakeholder engagement is important to effective and successful implementation of the Standard, this advanced indicator provides an opportunity for the site to assess how it is perceived in addressing shared water challenges. The natural space for stakeholder consultation centres around the issue of shared water

challenges since, by definition, this is of interest to all parties. However, stakeholder consultation need not, and should not, be restricted to this aspect. While proprietary and/or sensitive water-related data may be kept confidential, sites are asked to consult stakeholders on the full array of the site's water-related performance. This indicator is dependent on identifying stakeholders who are interested and willing to review the site's actions and provide constructive feedback.

4.4 EVALUATE AND UPDATE THE SITE'S WATER STEWARDSHIP PLAN

4.4.1 Continual improvement is a fundamental principle of the AWS Standard, and criteria 4.4 provides for the mechanism to ensure the plan is evaluated and updated periodically to ensure it is current and progressing positively.

This criterion pulls together the various evaluations conducted throughout Step 4 to update the primary plans developed in Step 2. Where appropriate, the evaluation should guide updates and modifications to the original water stewardship plan.

Modifications to the water stewardship plan may be influenced by a range of reasons, and may include the following:

- A target was achieved, so an action can be stopped or reduced in scope;
- A target was not achieved (or at too slow a pace), so new or modified actions may need to be implemented to improve on this;
- Stakeholders objected to an action or its outcome;
- An action did not have the expected consequence or impact;
- An action caused an unexpected unwanted impact;
- An action proved to be disproportionately costly;
- A change in regulation.

The timeline and periodicity of evaluation should be defined in the water stewardship plan, but should be at least annually, or more often. These data should be comprehensively reviewed at the specified interval, and evaluated to determine (list not exhaustive):

- The plan is delivering on the intended targets;
- The data being collected are appropriate for the purpose and aims;
- Baseline data are still relevant
- Lessons learned and areas for improvement recorded;
- Successful strategies and/or best management practices that have emerged or been implemented;
- Where stakeholder engagement efforts have been well-received (including transparency);
- Changes in water-related risk, whether for the better or worse;
- Changes in catchment context
- regulatory changes and enforcement;
- Areas of stronger and weaker performance;
- If efforts have been effective and efficient in terms of costs/benefits (socially, economically, or environmentally) and quantified where possible and practicable

STEP 5: COMMUNICATE AND DISCLOSE

GENERAL GUIDANCE FOR STEP 5

Communication of positive and negative results is an important aspect of responsible stewardship. It provides the basis for continual improvement through learning and sharing. It helps build trust and stronger relationships and allows others to better evaluate (and therefore contribute to) an organization's water-related efforts. Communication encompasses a broad array of different means of interaction and is intended as such within the Standard.

In recent years, the concept of disclosure (beyond financial reporting) has gained increasing traction in the sustainability/corporate social responsibility sphere. Disclosure involves a formal provision of information in a

format appropriate and comprehensible to the intended audience. This includes being in a local language where relevant.

Disclosure may include broad public accessibility, such as via a company website or sustainability report, but is not limited to these options. Examples of acceptable disclosure formats include:

- Community notice board
- Company website
- Annual sustainability report
- Responses to publicly accessible sustainability surveys (e.g. CDP-Water)

Disclosure (in accordance with this step) may start at the beginning of the water stewardship journey and continue in parallel with the development of water stewardship and need not wait until most actions are complete.

A challenging aspect of disclosure is the concept of “publicly” disclosed. What degree of disclosure constitutes “public” varies across the globe and across sectors. It is not possible to define exactly what is meant by public, and at what level disclosure becomes more problematic than beneficial. It is expected that at a minimum disclosure is to relevant stakeholders and any regulatory agencies as required. The site should also make information as public as practical and possible (see below).

AWS Standard disclosure is conceived in the spirit of the CEO Water Mandate (<https://ceowatermandate.org/>) on corporate water disclosure, of CDP-Water corporate disclosure program (www.cdp.net/en/water) and the Global Reporting Initiative (GRI) Standard on sustainability reporting (www.globalreporting.org).

5.1 DISCLOSE WATER-RELATED INTERNAL GOVERNANCE OF THE SITE’S MANAGEMENT

5.1.1 Water-related governance is ultimately focused on responsibility and accountability of water-related matters at the site. It is about having a clear line of authority in order to ensure that preventative measures are in place, as well as immediate corrective actions when things go wrong.

The governance disclosure effort needs to be publicly accessible in a suitable format for the target audience(s). The disclosure should:

- Provide a summary of how water-related issues at the site are governed at the site level. This can be a general overview of the management systems in place.
- Note positions accountable for compliance with water-related laws and regulations and note if this is a committee.
- Indicate the hierarchy between those accountable for water and the senior-most leadership at the site level (CEO or equivalent) or the board.

In cases where sites are part of a larger organization’s disclosure efforts, the larger corporate disclosure should indicate that site-level water-related governance is available upon request. If not, a separate site-specific report needs to be generated and made available to both verifiers and the target audience(s).

The format of disclosure is at the discretion of the site but should be appropriate for interested parties (e.g. possibly a presentation to community members, website content for civil society groups, annual sustainability report for investors).

5.2 COMMUNICATE THE WATER STEWARDSHIP PLAN WITH RELEVANT STAKEHOLDERS

5.2.1 Communication should be of a level of detail, language and format most relevant to each relevant stakeholder group.

5.3 DISCLOSE ANNUAL SITE WATER STEWARDSHIP SUMMARY

5.3.1 This aspect of disclosure should be a summary of the results (and/or efforts) the site has achieved in addressing its water-related challenges by making references to the site's water-related targets, as well as the site's commitment.

The disclosure of water stewardship performance needs to be accessible in a suitable format for the target audience(s) with results that pertain to material issues for the target audience;

The site is not requested to report on all results from its water stewardship plan (as detailed in 3.2) but should include all results that are material to the concerns of the target audience(s) and are encouraged to present as many results as possible in order to highlight the association of specific results with the site water risks and opportunities (e.g. creation or restoration of water-related assets such as natural and built water infrastructure).

Sites are not requested to disclose any financial figures unless they are not bound to confidentiality and figures help demonstrate the site's water stewardship performance in terms of financial, social, cultural or environmental shared value benefits.

Sites are encouraged to discuss any of the challenges and opportunities that arose in the context of their efforts to affect change. This helps provide an understanding of the enabling conditions and impediments to achieving the proposed targets. If not, a separate site-specific report needs to be generated and made available to both verifiers and interested parties.

The format of making the site's performance results available is at the discretion of the site but should be appropriate for interested parties (i.e. in local languages and a format that can be understood). This could include formats such as a community notice board, the site's website, annual sustainability report for investors, etc.

5.3.2 Annual reports represent a key organizational communication vehicle and are typically published both online and in print. As Sustainability or Corporate Social Responsibility reports are sometimes separate, these are acceptable as well, though AWS encourages water stewardship issues (along with other sustainability issues) to be incorporated into the main annual report via integrated reporting. The report, with page number, should explicitly reference AWS including explicitly mentioning one or more sites undertaking the AWS Standard, and contain any broader AWS commitments (if applicable).

5.3.3 See 5.3.2 and in this case also include specific benefits from implementation.

5.4 DISCLOSE EFFORTS TO COLLECTIVELY ADDRESS SHARED WATER CHALLENGES

5.4.1 Shared water challenges are identified, and should be drawn from, Criterion 1.6. The site should:

- List all shared water challenges
- Describe actions/efforts undertaken to address shared water challenges
- Discuss stakeholder engagement efforts, with an emphasis on engagement directed toward shared water challenges
- Actively disclose this information to target audience(s) and actively communicate this information to interested stakeholders in a suitable format(s).

Disclose efforts to collectively address shared water challenges, including associated efforts to address the challenges; engagement with other companies, organizations and community groups in the area; and coordination with public-sector agencies.

5.4.2 In addition to formal disclosure, sites are required to communicate efforts to address shared water challenges to relevant stakeholders in a manner that is both active and accessible. This means that the site should not be passive (i.e. requiring that stakeholders come to them) but instead should undertake efforts to provide such information to interested stakeholders. See details on stakeholder engagement at the beginning of the Guidance for more details.

The format of making the shared water challenges and responses available is at the discretion of the site but should be appropriate for interested parties (i.e. in local languages and in a format that can be understood). This

could include formats such as a community notice board, the site's website, annual sustainability report for investors, etc.

5.5 COMMUNICATE TRANSPARENCY IN WATER-RELATED COMPLIANCE

5.5.1 A summary of compliance may be provided, but any and all significant water-related violations should be made available. It is helpful to provide the context for such violations to allow others to understand why/how they occurred and how they might be prevented in the future. A site also may report in this section that it has gone "above and beyond" compliance through the completion of the AWS Standard.

AWS does recognize that in certain contexts, actively communicating such violations could cause undue attention and therefore heighten reputational water risks. Accordingly, this criterion does not require active communication of compliance violations. However, in all cases, sites should provide the relevant information to any stakeholder requesting the information. The fact that such information is available will be made known through the site's AWS-certified status.

The format of making the compliance violation available is at the discretion of the site but should be appropriate for interested parties (i.e. in local languages and in a format that can be understood). This could include formats such as a community notice board, violations noted on the site's website, annual sustainability report for investors, and others.

5.5.2 The site needs to also disclose what corrective actions it took to address the items raised in 5.5.1.

5.5.3 "Significant" water-related violations are any that heavily (materially) affect the company's finances, the freshwater ecosystems surrounding the site, or local people's use and enjoyment of fresh water. For example, a large number of complaints by stakeholders would indicate a "significant" water-related violation; a large fine for a water-related compliance violation also would be significant.

In cases where there is an immediate threat to local stakeholders, including ecosystems, note that the site should notify the relevant public sector agencies of the violation immediately. Sites found delaying in such instances will not be eligible for certification.

GUIDANCE ON SPECIAL SUBJECT: CATCHMENTS

Knowing the organization's catchment is critical to effective water stewardship

The aim of this guidance on catchments is to explain what they are, that surface water and groundwater catchments are different, and to provide a general explanation of how they are defined. It is not intended to be a textbook guide on how a site should define its own catchment. This is a specialist skill highly dependent on local conditions. Some organizations may have sufficient internal expertise, but very often, an organization will need specialist support. Some agencies, especially in more developed countries, can provide maps of defined catchments. These are a good starting point, but they may not automatically be suitable for a site's water stewardship approach. They are more often based on surface water catchments only, and whether surface- or groundwater-based, they are often of a larger size than is relevant for a single site, especially for smaller water users. (See Box on 'How a site can identify its catchment(s).')

Incomplete or incorrect knowledge of the catchment:

- May result in important risks being missed - to the organization, or from the organization to others
- May result in failure to identify critical stakeholders
- May result in focusing disproportionate cost and effort on the 'wrong' geography and/or stakeholders, or too large a geographical area

A catchment is not the same concept as Physical Scope, but it is an important component of it. However, the two may have the same boundary. Glossary definition:

Physical scope. *The land area relevant to the site's water stewardship actions and engagement. It should incorporate the relevant catchment(s) but may extend to relevant political or administrative boundaries. It is typically centered on the site, but may include separate areas where the origin of water supply is more distant.*

The site's catchment is the physical zone around the site which provides its water supply (upstream) and where its run-off and wastewater go (downstream). The site's water supply – quantity and/or quality – may be impacted by what happens upstream, and its actions may have an impact downstream, including on other water users and the natural environment.

Examples of upstream impacts:

- Pollution from industry or agriculture contaminates the water supply
- High rates of water use by others reduces the water available to the site
- Heavy rainfall causes flooding of the site

Examples of downstream impacts:

- High volumes of water use reduce what is available to others
- Untreated wastewater from the site contaminates natural water bodies or the water supply of others
- Removal of vegetation from the site property increases run-off rates after heavy rain, increasing flood risk to downstream properties

Surface water and groundwater catchments are defined differently. A water supply originates from either **surface water** or **groundwater**. Surface and groundwater catchments differ in their boundaries and characteristics. A minimum level of expertise is required to reliably define the catchment, especially for groundwater.

Surface water catchment

A surface water catchment is defined by the topography of the land. The boundary is the line of highest ground around a river basin, defined from topographical maps or satellite studies. The boundary is easy to define where river basins are separated by mountain ranges or hills, but more difficult in flatter landscapes. The boundary of a surface water catchment is fixed in time (except over geological time scales).

All precipitation (rain or snow) falling within the boundary flows down slope towards the principal water body, as run-off and along its tributary streams and rivers. A proportion is lost to evaporation and take-up by plants (collectively evapotranspiration), infiltration to the ground and to water users. In arid climates, evaporation is sufficiently high that very little or no surface water remains (although groundwater may still be significant). Where there are significant human interventions, such as canals, water flows may be significantly modified, and include transfers between catchments. Water may enter or leave the catchment embedded in products or services.

Surface water is replenished from direct precipitation, run-off and out-seepage of groundwater.

Groundwater catchment

Groundwater is stored in, and moves through, permeable geological layers known as aquifers via interconnected voids or pore spaces (its porosity).

Some groundwater catchment boundaries are fixed (by a geological boundary) and some movable. A movable boundary is defined by a 'groundwater divide' whose position can move due to seasonal effects or the impact of water abstractions.

Groundwater is replenished by infiltration of rainwater and surface water in 'recharge zones' where the aquifer is exposed at or near the surface below overlying permeable soil and rock. Groundwater naturally discharges to surface water (for example through river beds) or the sea.

Very often, large water supply boreholes (especially for public supply) already have their catchment zones defined and may also include designated source protection zones (SPZ). For example, the Environment Agency of England & Wales defines a three-stage SPZ: Inner Zone 1 represents a 50-day travel time for water flow to the borehole where surface and sub-surface polluting activities are prohibited. Intermediate Zone 2 represents a 400-day travel time which restricts sub-surface activities and limits surface activities. Outer Zone 3 represents the whole catchment from which groundwater flows to the borehole and for which potentially polluting activities are monitored.

Interconnection of surface water and groundwater

Depending on the geological conditions, there may be strong interconnection between surface water and groundwater, partial interconnection, or complete separation.

Understanding the level of interconnection is essential to understanding the physical scope and water-related risks. Where there is strong interconnection, impacts on surface water can also affect groundwater, and vice versa. There are also situations where there is *partial* interaction, for example, when a near surface and deep aquifer are separated by a semi-permeable geological layer. Where interconnection is significant, the defined physical scope should include both surface and groundwater catchments.

Box

When the catchment of relevance may be far from the site.

When the site's water supply is provided by a third party, such as municipal supplier, it may be piped to the point of use over many kilometers, potentially from a physically separate catchment. The concept also applies to 'downstream' when wastewater is piped to a distant wastewater facility. In these cases, the water supplier or wastewater utility are key stakeholders. The organization should understand how *they* manage and mitigate water risk.

Box

Watershed and catchment terminology

This box helps to clarify some of the different terminology conventions which can cause confusion.

Surface catchment area

Term	Where used	Comment
Surface water catchment	AWS, others	
Watershed	US English (and others)	
River catchment	UK English (and others)	
River basin	General	Also 'drainage basin'

The boundary

Term	Where used	Comment
Catchment boundary	AWS, others	
Divide	US English (and others)	
Watershed	UK English (and others)	Less commonly used due to confusion with US meaning
River basin boundary	General	
Groundwater divide	General	Flow boundary internal to a geological unit.

Defining the Site's Catchment

All sites are required to define their catchment(s) and should include both the catchment in which their site is located and those catchments their site is reliant upon for water sources. The guidance on delineating a catchment is as follows: it is the smallest catchment that contains the upstream land area or aquifer body contributing to its source(s) and that contains the downstream areas affected by the site's water withdrawals or effluent. When a site is sourcing water from multiple sources – either surface or groundwater or both – different catchments for each source will need to be identified.

Note that catchments, as defined by AWS, may extend into water bodies if such water bodies are employed as source areas or are receiving water bodies. For example, if a site is located beside a lake and both withdraws and discharges effluent to the lake, the affected area of the lake should be included in the catchment.

The distance downstream that a site is responsible for can reasonably be determined by the distance at which the site's actions can still be determined from baseline conditions. In other words, at a given location, if a discharged effluent from a site is detectable above baseline levels, then that location is within the site's catchment. Similarly, in terms of water withdrawals, if the amount withdrawn affects downstream users at a given location (both human and other species) either through the total volume or the timing of water withdrawal, then that location is within the site's catchment.

The limits of detectable influence downstream or down-gradient from a point of origin (water withdrawal or wastewater discharge points) can be determined in one of three suggested ways:

- In the best-case approach, the limits of detectable influence can be identified using a hydrologic simulation model. This can be a time-consuming and expensive exercise, but it provides the most technically credible and defensible means for delineating where a site's influence begins and ends. This level of technical analysis might be warranted once a site determines that significant ecological or social impacts exist or can be expected (Step 4 below).
- A next-best approach is to apply some default "general rules". For example, one might conservatively assume that water consumption or water quality effects (depending on magnitude of use/impact) in small rivers (<10 m³/s annual average flow) might extend for as much as 50km downstream, or until the small river is joined by a larger river (>10 m³/s). For larger rivers, the area of influence could be assumed to extend for 100km downstream. For aquifers, the area of influence could be assumed to extend to a radius of 50km from the point of extraction or wastewater discharge. Such rules of thumb will be discussed during stakeholder outreach to see whether reasonable guides can be developed.
- A least-desirable approach is to use pre-set watershed or river basin boundaries, such as standardized watersheds or river basins mapped by government agencies or research institutions. If the predetermined watershed boundaries are considerably larger than the site's actual area of influence, any estimation of the site's influence or impacts will be diminished. If this approach is applied, the smallest-possible watershed containing the site's points of water extraction or return/discharge should be used.

These methods, in general, will generate a conservative estimate for the catchment (i.e. an estimate that would include all major impacts that need to be considered). Regardless of the method chosen, the catchment identified should be reasonably justified by the site, and ultimately what constitutes a "sufficiently large" catchment should be determined by affected stakeholders.

Another method of thinking about catchment would be to think about the following: if a water-related incident (drought, flood, spill, etc.) were to occur in a given location upstream or downstream, would it materially affect your operations?

Generally, water-abundant areas, or sites in close proximity to water sources, will likely have smaller catchments, while the opposite will be true in water-scarce areas. Furthermore, sites with a large amount of water use/discharge may have larger catchments, while smaller sites may have smaller catchments. For transboundary water sources, the site may have more than one catchment. If the site is reliant upon water from more than one catchment, all such catchments should be included in the "catchment" scope.

To know how to best define its catchment, the site needs to understand certain terms:

Site's water sources

- Water sources include both the immediate or proximate water sources from which the site is drawing directly and the ultimate water source. In other words, for sites that are drawing directly from a water body (for example a lake, river, stream, groundwater well) this would be their only water source. However, in cases where a site was drawing its water from a water service provider, the water service provider AND its water source (i.e., the water source that the water service provider is drawing from) would be required. For example, if a site sources its water from a local utility, then the site would be responsible for listing the name of that utility AND finding out which water source(s) the utility employs for its water. Water sources can be fresh, brackish or salty. They can also be greywater (including recycled or polluted waters).
- If water derives from a variety of sources, the actual (or estimated) percentage of water by source should be indicated. For example, 75 per cent from Lake A, 15 per cent from River B and 10 per cent from Aquifer C. If such data cannot be obtained, the site should document the request and refusal from the relevant parties.
- Water sources should be referred to by their nationally recognized official names.

- The full range of water sources includes water service providers (including water utilities), groundwater, lakes/ponds, streams/creeks, rivers, wetlands, snow, glaciers and any form of captured precipitation, including dew and seawater or other brackish forms of water.
- National and sub-national topographic survey maps should provide a site with source locations.

Site's receiving water bodies:

- The same process for identifying source water bodies applies to identifying receiving water bodies. It is insufficient to only indicate that the discharge is received by a water service provider. The site should also determine where the water service provider returns the water to the environment and note this receiving water body.

The scale of catchments - what size is relevant to a given site?

For effective water stewardship, the defined catchment scale and boundary should be relevant to the site's situation. For too small a catchment, important risks and stakeholders can be missed. For too large a catchment, there is a possibility of investing disproportionate effort and costs on low or negligible risks or non-relevant stakeholders.

Catchments range from a few square kilometers to many thousands. Aquifers range in thickness from a few meters to hundreds of meters. For a catchment that is very large, a site may need to identify a smaller portion (sub-catchment) that is relevant to its own scale of water use and discharges. However, it is important to remember that a major event in the main basin, such as a drought or large pollution spill, could still impact the site water supply.

The starting point for the organization should be to identify the complete catchment. In many cases, however, this will be an unrealistically large area for the site to work with. For example, the Mississippi River Basin, which covers approximately half of the area of the United States, is far too large a catchment for any individual site. This can also be true for much smaller river basins, and for large aquifers. In such cases, the site can define a more appropriate sub-catchment, justifying the reasons for doing so.

Box

Getting help to identify the catchment(s)

Defining a catchment requires specialist knowledge and expertise. Larger organizations may employ a hydrogeologist. For small organizations or farmers, this may seem a disproportionate expense. Other sources include:

- Water management agencies.
 - Very often they will have already mapped the main catchments, especially surface water catchments (river basins).
 - They may also have mapped the main aquifers, but this is less common.
 - Their mapping is commonly at a large scale. A site's effective catchment may be a sub-catchment to the main one, which will still need some specialist expertise to define.
- Nearby universities. Depending on whether their subjects include water resources and geology, they may have information or maps of value. They may be able to provide some expert advice at a competitive fee.
- Environmental consultancies. Very often, they will have water experts, and may be willing to support smaller organizations. Consultancy companies may seem expensive to small organizations or farmers, but individual freelance experts may be more competitive.
- Environmental NGOs.

Box

Catchment – key messages

- An accurate definition is critical for effective and optimal water stewardship
 - Knowing the catchment(s) is relevant to assessing risks to the site and risks from the site to others
 - Surface water and groundwater catchments are defined differently
 - A surface water catchment (or river basin) is defined by surface topography and is fixed
 - A groundwater catchment is defined by geology (fixed) and groundwater flow paths (which may change over time)
 - Depending on the condition, a surface and groundwater catchment may be strongly interconnected, partially interconnected or wholly separate
 - Where the geographical catchment is very large, it can be appropriate to define a small part (sub-catchment) as representative of the site's effective catchment
 - For a site with its own private water sources and/or wastewater treatment facility, then the catchment(s) is specific to these. In some cases, the water sources and their catchment may be physically separate to the site.
 - Where a site relies on an external service provider for water supply and/or wastewater management, then the relevant catchment(s) should include that/those of the service provider
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GUIDANCE SPECIAL SUBJECT: IMPORTANT WATER-RELATED AREAS (IWRA)

This document covers the following:

1. Definition of IWRA
2. The role and relevance of IWRAs within the AWS Standard
3. How to identify IWRAs
4. How to assess the status of an IWRA
5. How to assess impacts on, or risks to IWRAs
6. Actions to address impacts and risks

1. Definition of IWRA

Glossary:

The specific water-related areas of a catchment that, if impaired or lost, would adversely impact the environmental, social, cultural or economic benefits derived from the catchment in a significant or disproportionate manner. Important Water-Related Areas are deemed “important” either by local stakeholders or by key stakeholders at regional or international levels. Important Water-Related Areas include areas that are legally protected or under a conservation agreement; areas that have been identified by local or indigenous communities as having significance for cultural, spiritual, religious or recreational values; and areas that are recognized as providing important ecosystem services, such as riparian areas, vernal pools critical for breeding of important aquatic species, aquifer recharge zones, wetlands that provide purification services, etc. A High Conservation Value Area (HCVA) is one form of Important Water- Related Area.

The term IWRA is not restricted to ‘areas’, but also applies to point features, such as a spring or water well.

The term ‘important’ can be subjective. For some features, it is clear they are important, for example, a public water supply borehole or a protected wetland. For others, it can depend on local tradition or the views of stakeholders, including indigenous peoples. A feature need not have an official designation to be considered ‘important’ to the local community. They should be identified through appropriate research and consultation.

The term ‘water-related’ includes not only water bodies, but encompasses areas or features that are linked to, or dependent on water for their condition and protection. This includes wetlands, marshland, riverbanks, riparian areas and floodplains. It may include an area that is dry for much of the year, but which depends on periodic flooding to support its ecosystem. However, the assumption is there will always be a link to water.

There are four main categories of IWRA: environmental, social, cultural, and economic, as explained below. Many features cover more than one of these categories. For example, a spring may have both cultural importance, and economic importance as a drinking water supply. A wetland of environmental importance may also have an important role in filtering out agricultural pollution.

The concept of High Conservation Values represents an advanced approach to defining and categorizing important conservation features (www.hcvnetwork.com). Brown et al. (2013) includes a special annex on ‘HCVs in freshwater systems’, representing additional guidance.

Environmental importance

The environmental importance of IWRAs includes natural features supporting landscapes and ecosystems. In addition to their aesthetic value, they are essential for supporting aquatic wildlife and species on their boundaries. They may be essential breeding grounds for birds, and they are often a source of water and food for birds and other passing or temporarily resident wildlife. An IWRA may be important for providing water volumes, protecting water quality or both.

Examples include:

- Water features: river, stream, spring, waterfall, lake, pond

- Wetlands (which are often a mix of open water and land with shallow water table)
- Recharge zones for aquifers
- Designated conservation sites (international, national, regional or local)
- Special or unusual features such as peatlands and karstic systems (cave systems created by water erosion and dissolution over geological timescales)

Community importance

IWRAs provide sites, resources and features essential to meeting basic needs. Examples include water sources for drinking water (e.g. hand-dug wells, boreholes, springs, surface water bodies used for that purpose); and freshwater animal or plant populations relied on by communities for food or other benefits.

Cultural importance

Water-related features may have important cultural, religious or spiritual value to the community or indigenous peoples. These are features that, more than any other, will require effective stakeholder and community engagement to help with identification. Examples include waterfalls, springs or lakes of special cultural significance; or mineral water springs.

Economic importance

Water is essential for economic development and stability, for general drinking water supply, for industry and for agricultural irrigation. Any water feature providing a direct supply is clearly of economic importance.

There is also economic value in the ecosystem services that water features supply. This can include climate regulation (e.g. humidity and air-cooling effects), flood alleviation, supporting pollinating insects and supporting fish stocks for food.

2. The role and relevance of IWRAs within the AWS Standard

One of the five intended Outcomes of the AWS Standard is to achieve the 'healthy status of IWRAs,' as stated in the Introduction and Theory of Change.

The organization is required to identify IWRA features on the site (Indicator 1.3.6) and in the catchment (Indicator 1.5.5). It should also identify best practices for maintenance of on-site IWRAs (Indicator 1.8.4), and report on implementation (criterion 3.5, indicators 3.9.4 and 3.9.9).

For on-site IWRA features, the organization is required to restore them (where degraded) and to maintain or improve them (Criterion 3.5), regardless of whether a feature is impacted by the site's water use or wastewater management

For off-site IWRAs in the catchment, the organization should understand whether its own water use or wastewater discharge, or any other of its activities, have an impact on, or present a risk to the IWRA. A feature could also present a risk or impact to the site or its water source. This may require an assessment by an expert. For example, the site's water abstractions may have an impact on water levels or flows at the IWRA feature; or pollution from the site may impact on the IWRAs water quality.

Catchment IWRA features may fall within the scope of shared water challenges, for which collective action may be agreed to restore or protect the feature.

3. How to identify IWRAs

Identifying all IWRAs will usually require a combination of methods, combining original research and stakeholder engagement. Suitable methods and information sources include:

- Published maps of recognized conservation sites and legally protected features
- General maps and satellite imagery
- Regulatory and environmental agencies and water service providers
- Consultation with stakeholders, such as landowners, businesses and farms for their views on important water-related features (including their own water sources)
- Conservation groups and NGOs

- Consultation with community representatives on features of cultural value. (Note that a feature could be of value to a community not physically located in the catchment)

The site should list all identified features along with their principal category/ies (environmental, community, cultural, economic), a short description, and why and to whom they are important. Where a feature is identified by stakeholders but concluded to be of insufficient status to be an IWRA, the organization should provide a justification.

4. Assessing the status of an IWRA

The Standard requires a description of the status of each IWRA (indicators 1.3.6 and 1.5.5, advanced indicator 3.5.3). The status is a measure of the current condition relative to a normal or healthy status. The current status of an IWRA may be described in qualitative or quantitative terms. The general idea is to gain a sense of whether the area is in good condition, heavily impaired or somewhere between. One approach could use the following 0 to 5 scale represents practical guidance:

0. Lost or beyond a financially feasible restoration
1. Severely degraded and will require considerable restoration
2. Somewhat degraded and will require some restoration
3. Acceptable condition but would benefit from improvement
4. Good condition requiring little work apart from protection
5. Excellent condition and protected requiring no work (beyond, perhaps, ongoing maintenance and monitoring)

Understanding the condition and status is important because for some cases, especially those rated 0 or 1, the only practical solution may be to maintain the IWRA by not allowing it to further degrade. The standard recognizes that maintaining an IWRA is acceptable for the criterion.

5. How to assess the potential impact on, or risk to IWRAs from the organization

Understanding where the organization has an existing physical impact or presents a physical risk to an IWRA is of greatest importance. However, it is also important to recognize that even if an absence of physical risk can be determined, there may still be a reputational risk based on a perception by stakeholders.

Understanding physical impacts and risks should start with a conceptual model of the water environment across the catchment. This is a visualization of the landscape and physical structure, and of how water flows through it and where it is stored. It should not be confused with a computer model, although computer modelling may be used to develop and assess it. The conceptual model may consist of maps and cross-sections or a 3-dimensional schematic.

The conceptual model should identify all relevant water bodies including aquifers, water sources and all other IWRAs, and include an understanding of how they are connected, or not connected, from a water and hydrological perspective.

For each IWRA, there should be an assessment of the actual or potential impact of the organization on its status. The potential for impact can depend on many factors, including whether the site and IWRA are connected by a common water body; the distance of the feature and its direction (downstream or upstream); and whether run-off from the site can have an impact on it.

Such assessments will usually require specialist expertise (e.g. water or environmental consultant), except in some simple and obvious situations. Below are examples of potential impacts between the site and an IWRA:

- Borehole abstractions cause water levels to fall in other boreholes or in a wetland, or cause the flow from a natural spring to decrease
- Surface water abstractions reduce river flow, or flows entering a wetland
- Wastewater discharge cause nitrates to rise in a sensitive surface water body and contribute to eutrophication
- Run-off from a farm cause sediment and agricultural chemicals (fertilizer, pesticides) to enter a sensitive water body

- Agricultural chemicals used on a farm (fertilizer, pesticides) infiltrate and contaminate an important underlying aquifer
- Chemicals stored on the site are flushed away in a heavy storm to contaminate a nearby water body, with a potential knock-on impact of harming or killing plant and animal species

Examples of impacts an IWRA can have on the site:

- Increasing abstractions from a public supply borehole cause the water level to fall in the site's own boreholes
- Occasional flooding of a wetland (although beneficial to its own condition) causes flooding problems at the site

The priority is to identify if there is a current impact, but secondly to identify risks and potential impacts. It is also valuable to report where the assessment shows there is no risk or a low risk of impact. The assessment should also consider the scale of an impact. It can be misleading to assume any impact is significant. A small and limited impact may be acceptable and reasonable.

6. Actions to address impacts and risks

For any IWRA located on site, the AWS Standard requires the organization to maintain, or where appropriate restore and protect it, regardless of whether there is an impact or risk.

For an IWRA feature located off site but within the catchment(s), the actions depend on the impact and risk assessment or whether it is part of a shared water challenge. If there is no impact or risk link between the site and the feature, then no action is required.

Where an impact or risk is identified, the organization has a responsibility to stop or reduce the impact, at least to the level it can be classified as insignificant. The action to achieve this will be dependent on the cause of the impact and nature of the IWRA. Examples of actions include:

- Improve water efficiency at the site to reduce water abstraction volumes
- Establish a new water source further from the vulnerable IWRA. In some cases, this could mean switching from a private to a municipal water source
- Upgrade wastewater treatment
- Change the location of wastewater discharge or switch to a municipal service provider
- Change how land is managed to reduce run-off from agricultural land
- Install buffer strips between agricultural land and sensitive water bodies
- Improve how chemicals are stored to reduce the risk of them leaking or spilling

Some IWRAs may be impacted or at risk from others in the catchment in addition to the site. In this case, actions should be part of addressing shared water challenges to remove or reduce impacts and risk, and may present an opportunity for collective action.

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GUIDANCE ON SPECIAL SUBJECT: STAKEHOLDER ENGAGEMENT

Within a catchment, all water-related physical processes and activities are interconnected, although some more strongly than others. It is in the interests of all parties to communicate and cooperate, even though they may not have the same priorities, and may be competitors for the same water resources. Understanding each other's priorities and interests will provide a better chance of benefit for all, and for protection of the natural environment. Stakeholder engagement is a tool for water stewardship, not an end in itself.

The priority reason for stakeholder engagement is to support planning for the organization's water stewardship actions. The process should ensure actions consider the needs and interests of stakeholders and the natural environment as well as those of the organization. The process of engagement can also motivate collective action with stakeholders.

The process of stakeholder engagement and the trust it can develop, may provide opportunities for the organization to influence water stewardship, first by setting an example to stakeholders, and second, by potentially influencing water governance policies.

What are stakeholders?

Stakeholders include any organizations, groups or individuals that have some interest or 'stake' in the implementing organization's activities and can affect or be affected by them.

The four main categories of stakeholders are:

1. Those who impact on the organization (e.g. regulators, other water users, polluters, special interest groups).
2. Those on whom the organization has (or is perceived to have) an impact (e.g., other water users, neighbors, conservation management organizations).
3. Those who have a common interest (e.g. similar business sectors).
4. Those who are neutral, with no specific link, but with whom it is beneficial to maintain a positive reputation and relationship.

Of most relevance are stakeholders associated with water use and dependency, but engagement should not be limited to these. Stakeholder Engagement should be much broader, as many issues are interlinked, including community welfare, local economy, natural environment and the organization's reputation.

Every location and situation are different, and roles and influence vary significantly between countries and cultures, but typical stakeholders include the following:

- Local authorities, regulators and other government agencies (e.g. municipality, environmental agency, water management agency, department of agriculture)
- Community
- Indigenous peoples and their traditional leaders
- Influential individuals or groups, such as fishing clubs, water sports clubs and enthusiastic conservationists.
- Farmers and landowners
 - Small farmers may independently have limited resources and influence, although their water rights and risks are important. Some may be represented via a collective with larger net influence.
 - Larger farms and landowners may have important surface water bodies on their property, or aquifers below.
- Other water users: industry, private homes, public supply
- Environment; commonly represented by conservation groups, NGOs, or including hunting and fishing clubs who have a strong interest in protecting the natural habitats

At the beginning

The organization should first have a good understanding of its water and wastewater situation, and have defined its physical scope, at least provisionally, which may ultimately be adapted because of stakeholder engagement. This information will come from Step 1-Gather and Understand. This puts the organization in the best position to:

- Plan where to engage and with whom
- Know its own water challenges and therefore be prepared for constructive discussions on shared water challenges
- Be prepared to respond to questions about its water use and wastewater management, for example, how much water it uses (total and net), what it uses water for, and where its wastewater goes.

In this context, the organization should know the location and nature of its water sources, and the main water bodies that supply them (surface water body or aquifer). If it uses only municipal supply, it should know the supplier and the main water bodies upon which it relies. Similarly, the organization should know where its wastewater goes in terms of location and receiving water bodies. The physical scope is based principally on the catchment(s) of relevant water bodies (surface and/or groundwater), as described in the 'Catchment' section of this guidance.

Timescales

There are two main timescales for stakeholder engagement. The short-term aim is to identify shared water challenges and to support the development of initial water stewardship actions. However, stakeholder engagement should be maintained as a long-term process of two-way engagement and communication. The organization should be ready to adapt actions if circumstances change, for example due to increasing demand for water in the catchment, increasing physical water scarcity, increasing water charges, and extreme events such as flood or drought.

How to start engagement

The key stages in Stakeholder Engagement are:

Identify and map stakeholders. Starting with a map of its Physical Scope, the organization should identify as many stakeholders as possible. Stakeholders should be listed (ideally in table form) identifying their name, location, contact and reason for being a stakeholder. It is recommended to also show stakeholders on the Physical Scope map. There are a number of ways a stakeholder may be linked to the organization's defined Physical Scope, which include being:

- Physically located within the Physical Scope (e.g. inhabitants, businesses, farms)
- Users of land, water bodies or IWRA features within the Physical Scope
- Suppliers of water or wastewater services to locations within the Physical Scope
- Governments and regulators with responsibility in the Physical Scope
- Other organizations with a strong interest within the Physical Scope (e.g. NGOs responsible for managing IWRA features)

Categorize stakeholders. The organization should review its stakeholders and categorize them according to the five categories noted in Table 1. The five types, inform, consult, involve, partner and reciprocate vary based on the degree of power to influence and their interest in water stewardship. This may be undertaken as a 'materiality assessment' (common terminology in sustainability reporting), whereby for each stakeholder it is assessed to what extent they are 'material' or important, to the organization and its water stewardship program. For some stakeholders, it may be possible to categorize them only after initial engagement. The category then helps define the form of engagement appropriate to each stakeholder or stakeholder group, shown in Figure 1.

Know the water policy framework and institutions. Engagement on water-related issues in the catchment should be within the context of the policy framework and institutions and should not conflict with them. The organization needs to be sensitive to others who hold responsibility. For example, if the organization and its stakeholders rely on municipal water supply, the organization should first go through the supplier. If it first discusses water supply issues or concerns directly with stakeholders, then it may raise mistrust. Equally, if the organization relies on its

own private water sources, it should first go through the relevant regulatory agency. The organization also needs to be aware of any existing engagement programs and start through them, so as not to duplicate work or conflict with existing programs. For example, England has an advanced program called Catchment Based Approach (CABA www.catchmentbasedapproach.org/) to promote engagement and partnership on a river basin scale.

Assigning responsibility within the organization's team. The organization should define a team to undertake stakeholder engagement, with responsibilities, tasks and a timetable of actions. This is a component of Step 3-Implement.

Plan of action. Once the stakeholders are identified and mapped, the organization plans actions accordingly. This will consist of a number of types of action; including: actions for engaging with and communicating with stakeholders (short-term and long-term); actions for developing partnerships with relevant stakeholders to address shared challenges; and specific actions to address water stewardship issues and shared challenges.

Categorizing stakeholders to guide communications

The most advanced stage in stakeholder engagement is to establish a program of long-term engagement combined with active promotion of water stewardship. This form of transparency is a first step towards influencing practice, and potentially policy, by example. The ultimate aim is to successfully encourage good water stewardship across the catchment to the benefit of all stakeholders and the natural environment.

The influencing of actions or policy needs to be managed carefully and sensitively. How it should be done is very specific to the local political landscape and culture. Considerations include:

- Be aware of any existing stakeholder engagement initiatives in the catchment. If they exist, the organization will have an opportunity to benefit from them and should avoid duplication of effort or conflicting actions
- For small farmers and businesses, their priority is economic survival, and they therefore need to understand how water stewardship actions can support this
- Farming communities may be conservative and skeptical to 'new ideas' from perceived 'outsiders.' It may require a program of long-term engagement (perhaps over years) to develop trust in the benefits of change
- Some NGOs are highly experienced at influencing practice and policy and can therefore make good partners in stakeholder engagement

Communicating with stakeholders

There are many possible methods for communicating with stakeholders, as shown in Table 1. The method should be appropriate to the stakeholder and determined from the outcome of the categorization process as described above and indicated in Figure 1. The organization needs to decide what form of communication and engagement is appropriate to which stakeholder, but it does not need to rigidly align with the categories shown in Figure 1. The form and method of communication should consider the cultural conditions and traditions of the community. This includes the levels of technological advancement and literacy within the community, and therefore whether digital, written or verbal communication is most appropriate.

Table 1. Examples of communication methods for different stakeholder categories

Inform	Consult	Involve	Partner
Send out information leaflets, newsletters, etc. (e.g. door-to-door, by post, email)	Questionnaire surveys	Advisory panel	Joint projects with other water users
Public access website	Focus groups	Invite input into planning of actions	Joint projects to protect or improve HCV features (e.g., with conservation NGOs)
Public presentations (e.g. at council meetings)	Stakeholder physical meetings		

		Interactive website, allowing feedback and comment	
Invitations to visit and tour the organization's site			
Press releases and media postings			
Information panels in public places			

The level of stakeholder engagement required

The Standard cannot define the appropriate level of stakeholder engagement, which will be dependent on a number of factors. The appropriate level can depend on considerations such as the following:

- The relative size of the organization in a catchment compared to other operations
- Whether the organization is considered a large water user or generator of wastewater
- Whether the organization uses its own private water sources or external service provider
- The scale of water-related challenges in the region
- The nature and advancement of water governance

Where a lower level of stakeholder engagement is justified, it should not allow for no engagement. The organization should show it has undertaken an assessment and can justify the level of stakeholder engagement it applies.

Consensus

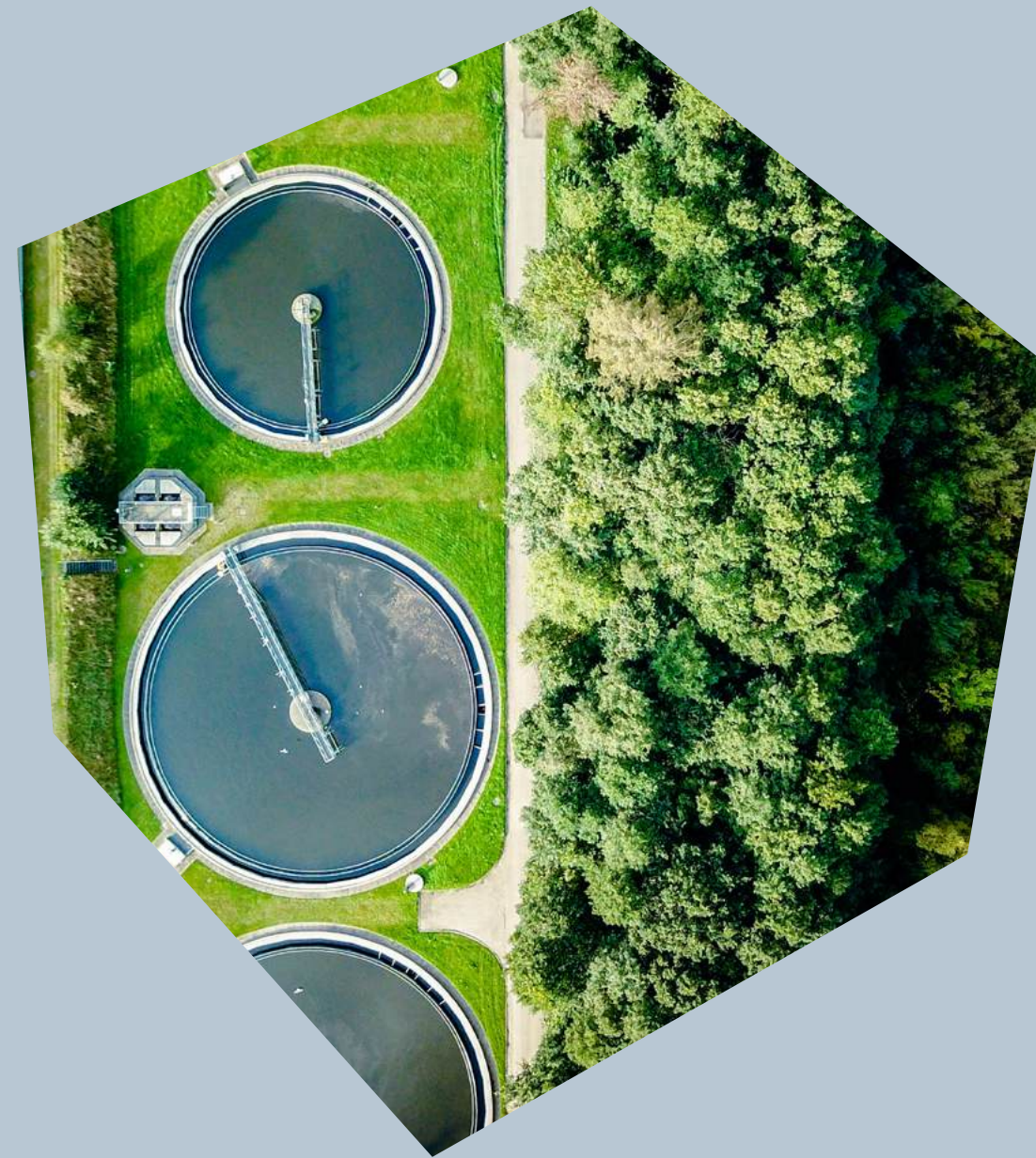
Where an organization is required to show consensus, it should show it has sought it, and ideally achieved it. Recognizing the organization cannot insist on feedback from its stakeholders, where feedback is difficult to gain the organization should show an absence of serious objections and that the interests of vulnerable stakeholders are not negatively impacted. Some indicators within the AWS Standard require the site to demonstrate it has sought consensus for its plans or actions, considering all reasonable positions and concerns.

Further guidance on stakeholder engagement

There are a number of guides on stakeholder engagement available from various sectors. Many of these are comprehensive and detailed and may be more appropriate for the more advanced levels of stakeholder engagement. Smaller organizations may not have the resources to undertake such comprehensive stakeholder programs. As stated at the beginning of this section, stakeholder engagement is a tool for achieving the water stewardship objectives and not an end in itself. As such, the scope and level of stakeholder engagement should be appropriate to the scale of the organization and the scope of its water use and wastewater generation, and relevant to the scale and issues of the catchment and defined physical scope.

The NbS Blueprint

→ *Building business cases
for Nature-based Solutions*



Foreword

Climate change, nature loss and mounting inequality are deeply intertwined. To achieve the Paris climate goal of limiting global warming to below 1.5°C, we must leverage nature and address biodiversity loss, and doing so requires equity-building partnerships with communities across the planet.

There are solutions that can deliver positive impact for climate, nature and equity simultaneously – Nature-based Solutions (NbS) offer a powerful example. However, despite the strong societal case for action on NbS, progress from the private sector has lagged: while \$5tn of corporate financial flows impact nature negatively every year, only \$35bn of annual investment goes to NbS.

In order to scale up investment and deployment of NbS, companies must see NbS as part of a business solutions toolkit. This view has not yet “gone mainstream”, despite efforts over the years to incentivize NbS across a broad range of applications, including resilience and adaptation, watershed development programs and natural infrastructure.

Leveraging NbS fully requires a broad understanding of achievable benefits that can contribute to a strong business case. The members of WBCSD’s NbS workstream have spent a year exploring how best to build business cases for NbS. The work has drawn considerably on insights and experiences of eight member companies’ NbS implementations, which are presented here as case studies demonstrating how a business can establish an NbS value proposition and communicate it internally and externally.

The result of this collective effort is this NbS Blueprint, which offers companies:

1. a business entry point to NbS connecting the company’s own rationale for action to the need for nature action;
2. a selection of available NbS, categorized by the business challenges that they can address;
3. a structured six-stage approach to build business cases for NbS – including tools and processes for stakeholder engagement, identifying broader business and societal benefits and the fundamental aspects of designing and costing NbS activities.

The NbS Blueprint approach allows users to identify the best applications of the most suitable NbS for their company, and to build out the portfolio of potential benefits. Our experience testing this content with WBCSD members and partners shows there is real appetite for this type of business-driven practical guidance on NbS. Companies are looking to take action that navigates sustainability challenges *and* connects to corporate strategy: the Blueprint enables sustainability teams to demonstrate the value of nature and NbS to functions across the business.

Any company can use the Blueprint to build a business case for NbS; it provides an approach to follow and includes pointers to a number of additional tools, guidance, and support available from other organizations. It can be used by companies engaging with NbS for the first time, as well as those that already have several projects up and running.

The Blueprint case studies demonstrate how eight companies built investable business cases to use NbS. We invite readers to follow their example, using the Blueprint and Solutions Map to capture the fullest range of NbS benefits, build strong value propositions for accelerating investment, and deliver broad positive impacts, both commercially and for climate, nature and equity.



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Executive Summary

Triple crisis – climate change, nature loss and rising inequality – demands action from companies

Global average temperatures last year reached 1.45°C above pre-industrial baselines, fuelling extreme weather and other events and causing many billions of dollars in economic losses in 2023.¹ Unprecedented rates of nature loss are already impacting business, as more than half of global GDP is moderately or highly dependent on nature.² Rising inequality is eroding trust in our political and economic systems and constraining economic growth.³ As pressure continues to mount on companies, pushing them to take action on climate change, nature loss and inequality, nature action offers an important solution set: more than 1/3 of all climate mitigation actions that must be taken to meet the Paris Agreement's 1.5°C target can be provided by Nature-based Solutions.⁴ At present, however, US\$5tn per year of private finance flows have a direct negative impact on nature.⁵

Nature-based Solutions offer climate, nature and equity action opportunities as well as clear value to businesses

IPCC AR6 puts Nature-based Solutions (NbS) among the top five most effective approaches for mitigating carbon emissions by 2030;⁶ NbS is embedded in the [UN Global Biodiversity Framework](#),⁷ and the evidence base for NbS

driving greater equity is growing.⁸ The broader societal case for supporting NbS is therefore strong. Despite this, only \$35bn/yr USD of private sector investment goes to NbS.

For companies looking to use NbS, the business case remains difficult to articulate and investment remains inadequate. There are business applications of NbS that are being missed, for instance: securing water access and water quality; improving soil health and agricultural yields; reducing risk from extreme weather events; and, value chain decarbonization. When applied to business challenges, well-designed NbS can deliver strategic value to companies along with contributions to net-zero, nature-positive and equity-positive outcomes.

NbS value propositions require companies to identify benefits outside traditional business cases

Companies need a business case to select, resource and implement NbS in place of a more traditional approach; this involves capturing the full range of value that any given NbS activity offers. The NbS Blueprint offers a six-stage process for building business cases so that users can make like-for-like comparisons with existing or standard solutions, maximizing overall value to the company and therefore making well-informed decisions about which option to use.

The stages are:

1. Identify key business challenges and opportunities
2. Explore NbS relevant to the company's challenges and opportunities
3. Collect information on overall impacts and benefits to the business from the chosen NbS
4. Identify the design and implementation process required
5. Estimate costs of NbS activities
6. Compare NbS options to other solutions across full range of benefits and costs

With this approach, companies can maximize NbS value and deliver for climate, nature and equity.

Nature-based Solutions have a significant role to play in achieving Vision 2050, a world in which more than 9 billion people live well and within planetary boundaries by mid-century. NbS can also help companies to transform themselves. Recognizing the true impact of NbS – both on societal challenges and creating value for companies – is a crucial step in realizing NbS's full potential as a powerful solution set to deliver for climate, nature, equity and business ambitions at scale.

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01. Introduction

01. Introduction

Background and context

WBCSD's Vision 2050 – a world in which more than 9 billion people live well and within planetary boundaries by mid-century – is still within reach. However, societies have yet to take action at the scale necessary to address the three major and interconnected challenges facing the global community: the climate crisis, nature loss, and mounting inequality. A net-zero, nature-positive and equitable future will only come about if business leaders drive transformative change in their strategies, operations and offerings.

Nature underpins the global economy. Unprecedented rates of nature loss are already impacting business, as more than half of global GDP is moderately or highly dependent on nature. Importantly, every industry has some level of dependency on nature.⁹ Biodiversity loss and ecosystem collapse is now considered the third-highest long-term global risk by severity after extreme weather and climate change¹⁰ Current species loss is estimated to cost the global economy USD479bn per annum.¹¹

Recognizing these risks, several international bodies and national jurisdictions are pushing for increased corporate action to address biodiversity and nature loss. At the heart of the Kunming-Montreal Global Biodiversity Framework (GBF), for example, is a mission for global no net-loss of nature by 2030, moving to nature-positive by

2050. GBF Target 15 specifically calls on governments to enable and encourage businesses to assess and report on their dependencies and impacts on biodiversity. Strong regional regulatory push has also emerged, for instance in the EU's Corporate Sustainability Reporting Directive (CSRD) which places new nature-related disclosure obligations on many companies.

Within this rapidly evolving space, several industry-driven initiatives are providing guidance and voluntary standards to accelerate nature-positive corporate action. These include the Science-based Targets Network (SBTN) and the Taskforce on Nature-related Financial Disclosures (TNFD). Building on these international initiatives, WBCSD has created a series of [Roadmaps to Nature Positive](#), offering step-by-step guidance to businesses at all nature maturity levels to advance their nature action journeys, focusing on where dependencies, impacts, risks and opportunities (DIROs) are most material. WBCSD has also collaborated with the World Economic Forum and Business for Nature, to provide a set of [Sector Action Overviews](#) that outline the main dependencies, impacts and priority actions for 12 high-impact sectors. The aim of all these initiatives is to enable companies to take credible, impactful action to help halt and reverse nature loss and contribute to an equitable, nature-positive economy.

The climate, nature and equity crises are intertwined, but there are solution sets that address all three challenges simultaneously. Nature-based Solutions (NbS) use the core aspects of nature action to deliver positive impact and solutions for Nature, Climate, and Equity.^{12,13} However, current use of (and investment in) NbS is limited; UNEP reports that annual private sector financing of NbS activities is only \$35bn USD, compared to \$5tn USD per year of private finance flows with a direct negative impact on nature.¹⁴

Companies are often unaware of their dependencies on nature and few instinctively consider the role that natural solutions can play in addressing business challenges. This Blueprint and its supporting material helps companies to identify and build the case for using NbS to address both business and societal challenges.

[Roadmaps to Nature Positive:](#) The Roadmaps to Nature Positive: Foundations serves as a basis for all business to understand and play a part in halting and reversing nature loss by 2030. Following the ACT-D high level actions on nature, the Foundations cut through the complexity of the nature agenda, providing companies with detailed how-to guidance, and identifying priority action areas and transformation levers to accelerate nature action.

Definition and role of Nature-based Solutions

The UN Environment Assembly defines Nature-based Solutions as:

*... actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.*¹⁵

The fifth Session of the United Nations Environment Assembly adopted this multilaterally agreed-upon definition of NbS in 2022, recognizing the important role these solutions play in the global response to climate change, biodiversity loss and the resulting social and economic consequences. IUCN's Global Standard for NbS (2020)¹⁶ provides more detail, listing the societal challenges that NbS can address as: climate change mitigation and adaptation; disaster risk reduction; economic and social development; human health; food security; water security, and environmental degradation and biodiversity loss.

How do NbS address business challenges?

Societal challenges are often also business challenges. For example, heat waves, floods and scarcity of natural input materials can all cause business interruptions. And few businesses can operate without access to clean water as it is often an essential input – at a minimum it is a pre-requisite for a healthy work force, which is a key determinant of business performance.¹⁷ Well-designed and -delivered NbS can manage flood risk and improve water filtration, reducing business interruptions and improving performance at the same time.

NbS can offer companies a wide range of such benefits, including:

1. Reducing **supply chain risk** and strengthening supplier and regional stakeholder engagement (e.g. using regenerative agriculture to improve consistency of agricultural yield)
2. Reducing **risk exposure in own operations** (e.g. improving suppliers' plantation management to reduce disruption of supply for key raw materials)
3. Reducing business **impact on nature** and biodiversity (e.g. delivering toward company nature targets by using wetland restoration in place of engineered solutions)
4. Improving **business performance** (e.g. implementing regenerative agriculture on suppliers' farms to improve the quality of raw materials)

5. Supporting **regulatory compliance** and protecting license to operate (e.g. using wetland restoration to meet compliance requirements for site closure and deliver benefits to local communities)
6. Controlling and **reducing CAPEX and OPEX** for projects (e.g. using a self-maintaining ecosystem in place of a landscaped area to reducing maintenance costs)
7. Delivering direct and indirect **health benefits** to communities and employees along value chains (e.g. using wetland restoration to increase access to cleaner water)
8. **Decarbonizing** value chains (e.g. improving agricultural practices to increase carbon sequestration), and
9. Reinforcing recruitment, **employee engagement** and external brand recognition (e.g. restoring natural ecosystems to improve access to green spaces).

Common examples of business application of NbS include: climate mitigation and value chain decarbonization;¹⁸ treatment of industrial processes and waste water; securing water access and water quality; remediation of contaminated land; reducing risk of urban heat islands; reducing risk of wind and storm surge exposure; and, improving soil health and agricultural yields. When delivered through well-designed and effectively-implemented NbS, all of the above can help deliver strategic business performance alongside contributions to nature-positive, net-zero and equity-positive outcomes.

Building business cases for Nature-based Solutions

The societal case for NbS is strong: the IPCC AR6 puts Nature-based Solutions among the top five most effective approaches for mitigating carbon emissions by 2030;¹⁹ NbS is embedded in the UN Global Biodiversity Framework;²⁰ and, the evidence base for NbS driving greater equity is growing (as detailed by work from UNEP, IUCN and ILO).²¹

However, for companies looking to use NbS, the business case remains difficult to articulate and investment remains inadequate. Companies, advisors and experts have little experience in identifying and translating the value that specific NbS offer to companies, and examples of delivery are scarce. Combining the capacity of NbS to address both business and societal challenges offers companies a way of strengthening the business case for investments into NbS.

NbS has been shown to deliver effective responses to critical societal issues. The purpose of this NbS Blueprint is to demonstrate how NbS, in addition to offering broad societal benefits, can also be applied to address business priorities, such as reducing supply chain risks, controlling costs, and increasing yields. The NbS Blueprint will help companies to apply NbS to address business challenges, while also taking credible, impactful action on Climate, Nature, and Equity issues.



02. The NbS *Blueprint*

02. The NbS Blueprint

Objective of the NbS Blueprint

Business cases are crucial to mainstream NbS as a viable (and, in time, preferred) solution-set for key business challenges. The NbS Blueprint is designed to guide companies through the process of preparing for, and then building initial business cases for using NbS that address their business challenges and opportunities.

The NbS Blueprint helps companies to understand the types of questions that need to be answered early on, shares examples of how NbS add value to companies by addressing business and sustainability issues (demonstrated through the accompanying case studies), and demonstrates how to augment the development of the business case to capture a wider range of benefits (and costs).

We have created a complementary tool, the [Nature-based Solutions Map](#), that helps companies to navigate a range of potential NbS, categorized by the business challenges they help to address.

Following the guidance in this Blueprint and the Solutions Map will enable the reader to:

- identify NbS capable of addressing existing/developing business challenges and opportunities;
- outline key sources of business value that a chosen NbS can offer the company;
- start compiling the costs associated with implementing an appropriate NbS, and
- compare the available solutions (traditional and NbS) and their overall outcomes.



Focus of the NbS Blueprint

The NbS Blueprint is set up to demonstrate the range of benefits that Nature-based Solutions offer to companies, and to provide guidance on the building of business cases to support the selection of NbS approaches. The following four factors have influenced the development of the Blueprint:

Showcasing the range of potential benefits that NbS can deliver beyond climate mitigation

The existence of a carbon price and market enables companies to quantify carbon benefits from NbS, and guidance already exists to aid companies in the use of NbS for climate mitigation.²² The selection of case studies in the Blueprint demonstrates a range of business and sustainability benefits beyond climate mitigation alone that can be achieved through the deployment of NbS. The supporting [Nature-based Solutions Map](#) provides companies with a menu of the various NbS that could be deployed, and the business challenges that each can help address.

Focus on companies looking to use NbS within their value chains

The primary audience for this guidance is companies who are interested in the societal and potential business benefits of NbS, but are not able to resource and deliver NbS activities without a stronger business case. At this stage, the Blueprint is designed for NbS within companies' operations and value chains, where NbS offers a specific set of business benefits. It does not cover beyond value chain action using NbS; for

more guidance on this topic, we refer to the Natural Climate Solutions Alliance.²³ It is also not intended for project developers or NbS practitioners looking to build investment cases based on societal benefits from NbS activities; on this topic, we recommend referring to the work of organizations such as The Nature Conservancy.²⁴

Real-economy perspective on NbS

The NbS Blueprint prioritizes its guidance for the real economy rather than financial institutions; while there are important aspects of NbS business cases that apply to both audiences, there are also several key differences (e.g. real economy companies can derive direct benefit from ecosystem services, whereas financial institutions may only infer benefits from the revenue they can generate). For the investor perspective on NbS, we recommend referring to the work of organizations such as UNEP-FI²⁵ and CPIC.²⁶

Shifting how companies view and value NbS

This guidance is designed to highlight how Nature-based Solutions deliver business benefits while impacting positively on societal challenges (such as climate change, nature loss and inequality). In doing so, the Blueprint aims to shift how NbS activities are viewed and valued by companies. This guidance is designed to show companies how they can adapt their existing business case approach to capture a wider range of benefits, and will offer the most support where companies are still early in the process of exploring NbS opportunities. As a result, it is not intended to provide detailed information on costs and benefits, which companies will need to develop for each NbS considered.

The NbS Blueprint case studies

This guidance draws insights and examples from eight case studies, shown in Table 1. Each case study illustrates different ways companies have identified the value or benefits provided by NbS approaches and then translated these into a rationale for internal decision-making and financing.

The case studies profile NbS approaches in projects across sectors and geographies, solving a range of business and sustainability challenges through their application. They show that NbS can be explored by companies that are just beginning to think about how to address nature impacts and dependencies, as well as by those that have well-established nature-action strategies. Each example shows how companies developed a business case to justify going forward with an NbS approach over more traditional solutions.

Additional information on each of the NbS Blueprint case studies can be found on page 36 to 51 of this document.

Table 1: List of NbS case studies from WBCSD member companies

1 Arcadis Coastal ecosystems restoration in the Netherlands (reduced nature impacts) The Marker Wadden project increased biodiversity significantly in a manmade freshwater lake by creating artificial island habitats; it also provided coastal protection to nearby swamplands and established a dedicated ecosystem research area.	2 Bayer Sustainable agriculture in Brazil (increased productivity and profitability) The PRO Carbono program was established in collaboration with farmers to support their transition to more sustainable land management practices in line with regenerative agriculture. Field trials prior to the program showed improved local ecosystem services and soil health alongside increased farm productivity, profitability and reduced carbon emissions.	3 Dow Wetland restoration in USA (reduced OPEX) Dow used wetland restoration to close an ash pond with legacy site issues, resulting in a 9-hectare NbS that reduced maintenance costs, benefitted local flood management, improved water and air quality and reduced impact on nature.	4 Givaudan Regenerative Agriculture in Brazil (mitigated supply chain risk and improved quality) The GUARABEST program uses regenerative agriculture practices to increase supply chain resilience and improve the quality of guarana produced, while benefiting farmers. This program has evolved to deliver against Givaudan's environmental and responsible sourcing commitments as well.
5 Godrej Coastal ecosystems restoration in the Netherlands (reduced nature impacts) Godrej and its partners designed the IWDP to benefit the local ecosystem through a combination of wetland restoration and improved agricultural practices on nearby farms. The company sought to reduce its impact on nature while managing the risk of water stress at a nearby Godrej facility.	6 GSK Watershed replenishment in India (mitigated water risk and improved agricultural yields) GSK's local partner is using ecosystem-based water management and sustainable agricultural practices to improve local water storage potential, reducing the company's water risk while delivering positive impacts on nearby communities' health and livelihoods (e.g. through cleaner water and improved agricultural yields).	7 INGKA Wild gardens for local biodiversity in Romania (reduced OPEX) INGKA piloted using local ecosystem restoration in place of traditional landscaping at a company site in Timisoara, reducing both nature impacts and maintenance costs while also delivering benefits to employees and customers.	8 Reckitt Sustainable cultivation of rubber in Thailand (improved supply chain resilience) Reckitt is working with local stakeholders and expert partners to improve rubber cultivation practices, using NbS to protect and restore nature while also improving supply chain resilience, farmer livelihoods, and TNFD disclosure.

03. Building a business case for NbS

NbS can offer a wide range of benefits over alternative approaches, while still addressing the same business challenges and/or opportunities. Using the NbS Blueprint will help companies to move beyond defining NbS benefits in terms of societal value alone, by first identifying a clear commercial justification for the consideration of NbS. The guidance is drawn from the lessons learnt from the Blueprint case studies.

Any departure from business as usual will normally demand that a business case be built for the new direction. This section of the Blueprint guides companies through building a robust and compelling business case that will help a commercial audience understand why an NbS deployment is being considered over a more traditional business-as-usual solution. It also outlines

how companies can calculate what the likely costs and benefits of the deployment will be.

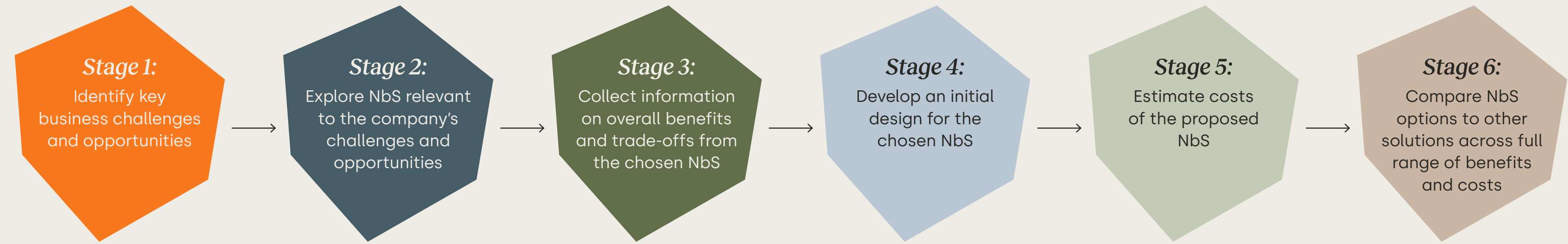
The NbS Blueprint proposes six stages for building NbS business cases, augmenting common steps in the standard business case process with NbS-appropriate tools and approaches derived from the case studies and available guidance on this topic. The stages are as follows:

- 1. Identify key business challenges and opportunities
- 2. Explore NbS relevant to the company's challenges and opportunities
- 3. Collect information on overall benefits and trade-offs from the chosen NbS

- 4. Develop an initial design for the chosen NbS
- 5. Estimate costs of the proposed NbS
- 6. Compare NbS options to other solutions across full range of benefits and costs

This process is designed to navigate the user from identifying challenges and opportunities (before NbS are even considered), through to comparing the relevant NbS activities with the business-as-usual options available.

Importantly, these six stages focus the initial business case primarily in terms of what the business already wants or needs to do, reducing internal resistance to using a new solution/approach.



Stage 1: Identify key business challenges and opportunities

The first stage in building a strong NbS business case is to aggregate the information and insights on current challenges and opportunities from already-existing assessments of direct operations and supply/value chains. Some of the typical challenges and opportunities identified in the Blueprint case studies are shown in Figure 1.

Why do this?

The objective of this stage is to ensure that companies are selecting Nature-based Solutions that address the business' challenges and opportunities.

Blueprint users complete this stage by using existing or new assessments of their own operations and value chains to build a comprehensive list of current and developing business challenges and opportunities.

Figure 1: Synthesis of business challenges and opportunities addressed by NbS in the Blueprint case studies



Risk management & mitigation:

- Investor pressure
- Supply chain resilience
- Regulatory requirements
- Reputation risk

Business performance:

- Profitability
- Client demands and expectation
- Cost control and reduction

Strategic priorities & ESG:

- Climate/Nature/Equity commitments
- Corporate citizenship
- Regulatory requirements

Please note that the definition of drivers might differ sector by sector.

Building a business case for NbS
→ *Stage 1: Identify key business challenges and opportunities*

Companies already undertake assessments of their own operations and supply/value chains for a wide range of reasons – risk management, carbon emissions accounting, nature impacts and dependencies, or to gather other important information about the business and its operations.

While each of the above analyses will provide some useful data for identifying opportunities to deploy NbS, the most relevant information is likely to come from a nature materiality assessment. This type of analysis is strongly encouraged, as it will ensure that the NbS business case recognizes the company's dependencies and impacts on nature and ecosystems as well as nature-related risks and opportunities from the outset ("DIROs" in TNFD terminology).

At a minimum, all companies should review the reference information for their sector and/or sub-industry available from the ENCORE tool.²⁷ This will provide indicative information on sector-relevant nature dependencies and impacts, helping companies to consider at a high level where their operations and value chains interface with natural ecosystems – and therefore where NbS can offer the most value.

To collect more granular information, companies should undertake a detailed materiality assessment, following the guidance laid out in Stage 1 of [WBCSD's Roadmaps to Nature Positive](#), which draws on existing frameworks such as TNFD and SBTN. For instance, after completing the initial scoping element of the TNFD "LEAP" approach,²⁸ companies will already have enough preliminary data to start identifying opportunities to use NbS; completing the subsequent "Locate" step will offer a much more detailed, useful dataset for building the case for any relevant NbS activities.

With or without a nature materiality assessment, companies can use/add information from:

- risk assessments (including existing and expected future issues) to incorporate physical and transition risks;
- strategic priorities for the company, including but not limited to sustainability priorities;
- carbon emissions accounting to include emissions hotspots and climate action priorities; and
- additional analyses of assets and operations, particularly those offering integrated or holistic accounting of different resources and/or impacts (such as the Capitals Coalition approach).²⁹

In order to identify where best to apply NbS, companies can combine the results of these different assessments to build a map of business challenges and opportunities linked to nature dependencies and impacts across their operations and value chains. Teams should then use this information to create a new dataset organised by two factors:

- the type of business challenge/opportunity, and
- the region/biome where each is located.

Once this dataset is finalised, teams should flag the challenges/opportunities that are already recognised as priorities for the company, and also the geographical regions where multiple challenges and/or opportunities are located.



Figure 2: Example datasets from Blueprint case studies showing priority business challenges/opportunities and biomes/regions

Case Study: Godrej	
Business challenge/opportunity	Biome/location
Manage water stress on facility	Wetland, India
Meet targets of Integrated Watershed Development Program	Wetland/agricultural land, India
Improve soil health in neighbouring agricultural areas	Wetland/agricultural land, India
Improve economic outcomes for local communities	Wetland/agricultural land, India
Leverage experience from philanthropic NbS work to deliver positive impact for Godrej	Wetland/agricultural land, India

Case Study: Bayer	
Business challenge/opportunity	Biome/location
Mitigate supply chain risk	Agricultural land, Brazil
Improve farm productivity and reduce yield variability	Agricultural land, Brazil
Improve soil quality and reduce impact of chemical crop protection	Agricultural land, Brazil
Reduce soil erosion from wind and water	Agricultural land, Brazil
Improve farm profitability and farmer livelihoods	Agricultural land, Brazil
Reduce value chain GHG emissions	Agricultural land, Brazil
Improve & broaden value chain engagement	Agricultural land, Brazil
Improve local water and air quality	Agricultural landscape, Brazil
Improve habitat for local biodiversity	Agricultural land, Brazil

Building a business case for NbS
→ Stage 2: Explore NbS relevant to the company's challenges and opportunities

Stage 2: Explore NbS relevant to the company’s challenges and opportunities

Building on Stage 1’s dataset of the company’s priorities and biomes, Stage 2 identifies the NbS activities that address the company’s challenges/opportunities in the appropriate biomes.

Why do this?

The objective of this stage is to enable companies to focus on the NbS that are most relevant to their existing challenges and opportunities, in the relevant locations.

Blueprint users complete this stage by using the outputs of Stage 1 and the “Nature-based Solutions Map” to identify the NbS activity/activities best-suited to add value to the company by addressing its identified challenges and/or opportunities.

The “[Nature-based Solutions Map](#)” linked to this guidance can help companies with this stage of building the business case for NbS. Using a similar structure to that shown in Figure 3, the Solutions Map arranges NbS activities by the business challenges they can address and the biomes where they can be applied. This enables companies to generate an initial set of NbS that they can consider against the challenges and opportunities identified in Stage 1.

Figure 3 depicts how the dataset from Stage 1 can be applied to the Nature-based Solutions Map, using the Blueprint case studies from Figure 2 as examples.

WBCSD’s Nature-based Solutions Map can be used in conjunction with the CEO Water Mandate’s [NbS Benefits Explorer](#), which provides additional detailed information on the ecosystem processes and benefits involved in a broad range of NbS activities.



Figure 3: Map of business challenges/opportunities and biomes/regions, with two Blueprint case studies identified

Example business challenges/opportunities		Biomes							
		Forests & woodland	Savannas, grasslands & deserts	Intensive land use systems	Urban & industrial	Rivers & lakes	Wetlands	Coastal	Open ocean
Core business	New & improved raw materials, products and services		Regen. ag. (Bayer)						
	Cost reduction								
	Increased asset value								
	Resilience of operations and supply chain		Regen. ag. (Bayer)						
	Regulatory compliance								
	Social licence to operate and meeting consumer expectations								
	Increase brand value and equity								
	Increase circularity								
Climate	Emissions avoidance/reduction		Regen. ag. (Bayer)						
	Emissions removals		Regen. ag. (Bayer)						
	Climate adaptation								
Nature (including biodiversity)	Avoid/reduce nature impacts and/or dependencies								
	Restore/regenerate natural ecosystems								
Water	Flood management								
	Managing water stress						Wetland restoration (Godrej)		
	Water treatment						Wetland restoration (Godrej)		
Equity (including social)	Employee engagement								
	Improving supplier livelihoods								
	Economic development for local communities						Wetland restoration (Godrej)		
	Human health & well-being						Wetland restoration (Godrej)		

Building a business case for NbS
→ *Stage 3: Collect information on overall benefits and trade-offs from the chosen NbS*

Stage 3: Collect information on overall benefits and trade-offs from the chosen NbS

Once one or more suitable NbS have been identified, the next stage is to map out the potential benefits for all stakeholders (including the company), expanding the scope to consider factors that are often overlooked in a traditional business case process.

Why do this?

The objective of this stage is to ensure that companies are capturing all the relevant impacts of the NbS, including benefits and drawbacks to the business, relevant landscapes and stakeholders.

Blueprint users complete this stage by working with stakeholders and using tools such as the Solutions Map, landscape-level analysis and forecasting to build a portfolio of benefits and trade-offs for the solutions being considered, both NbS and traditional.

This stage contains three elements:

- 3.1: Establish full range of benefits
- 3.2: Identify full range of trade-offs
- 3.3: Evaluate benefits and trade-offs

The success and continuity in the NbS activity depends on maximising positive outcomes while minimising negative ones. All NbS activities should do no harm to climate, nature, or people as a minimum – a crucial part of delivering NbS is ensuring that they do not compromise one or more fundamental sustainability priorities in order to deliver other benefits.

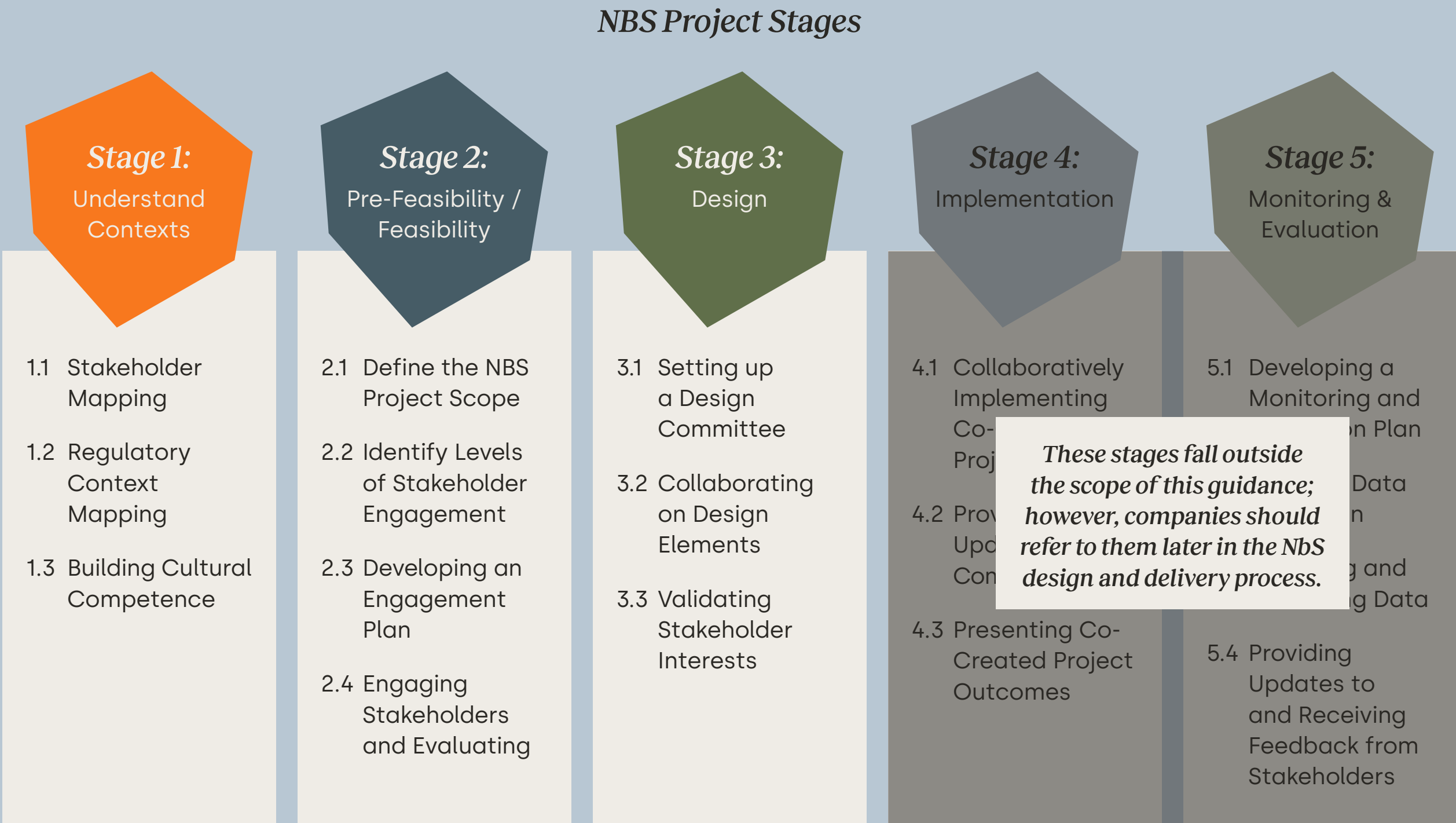


Spotlight: stakeholder engagement

CEO Water Mandate's *Stakeholder Engagement Guide For Nature-Based Solutions*³⁰ notes that "effective stakeholder engagement is paramount to the long-term success of any NBS project", and provides a framework for involving stakeholders throughout the process of delivering an NbS. The relevant sections are shown in Figure 4.

Each of the activities listed in Figure 4 offers important inputs to the NbS business case in development. Mapping stakeholders and regulatory requirements (as well as building cultural understanding of the local context) will enable companies to connect with the right stakeholders and delivery partners, including key groups such as Indigenous Peoples and Local Communities. Working with local partners to define the scope of the NbS, appropriate levels of stakeholder engagement, and developing an engagement plan, will create and prepare a community of stakeholders around the NbS to best enable its success, and ensure that fundamental stakeholder safeguards (such as provision of Free, Prior and Informed Consent³¹) are maintained.

Figure 4: Stages of the NbS stakeholder engagement framework (adapted from CEO Water Mandate, 2022)



To start mapping stakeholders, the *Stakeholder Engagement Guide For Nature-Based Solutions* suggests the “Four As” approach.³² In a table, list the different Actors (who are impacted by or dependent upon aspects of the NbS), their Agendas, the Arena in which they operate and the Alliances they influence or are influenced by. Companies can then add the “levels of stakeholder engagement” to this map. Figure 5 shows an illustrative example of such a combined map; it is based on a theoretical case of a copper mining company looking to use forest and/or river restoration for water quality and quantity management in New South Wales, Australia.

Completing an initial stakeholder map will give companies a first outline of key stakeholders and potential partners to engage with throughout designing and delivering the NbS.

Figure 5: Combined stakeholder map from theoretical example of Copper Eagle Mining (CEO Water Mandate, 2022)

Actor (name, function)	Agenda (mandate/mission, strategic objectives)	Arena (field of action, outreach)	Alliances (relations with other actors)	Engagement
MDBA	An independent, expertise-based statutory agency that was established by the Water Act; responsible for coordinating how the basin's water resources are managed through the Basin Plan.	Administer the Basin Plan; measure/monitor/ record the quality and quantity of the basin's water resources; support and conduct research about the basin's water resources and ecosystems.	MLDRIN, NBAN, state governments, Australian governments, WaterNSW, NSW Planning, Industry, and Environment Department – Water	Collaborate
NSW Planning, Industry, and Environment Department – Water	State agency responsible for water security and managing NSW water resources, including surface and groundwater management, and ensuring equitable sharing of water resources.	Administer Water Management Act 2000; assess, manage and review major developments in NSW; develop allocations for licensed water users; track water extractions.	WaterNSW, NSW NRAR, MDBA	Involved
NBAN	Non-profit that represents, advocates for and empowers First Nations in the northern Murray-Darling Basin in water management.	Form strategic advice on policy development and project execution; advocate for and research cultural flows.	MDBA, NSW Government, MLDRIN	Empowered
Murray-Darling Wetlands Working Group	Focused on restoring and managing Murray-Darling wetlands by linking community, science, business and government.	Help implement wetland management plans and activities on private and public property; manage environmental water delivery; train community groups and Aboriginal communities.	NSW Planning, Industry, and Environment Department – Water	Empowered

Building a business case for NbS
→ Stage 3: Collect information on overall benefits and trade-offs from the chosen NbS

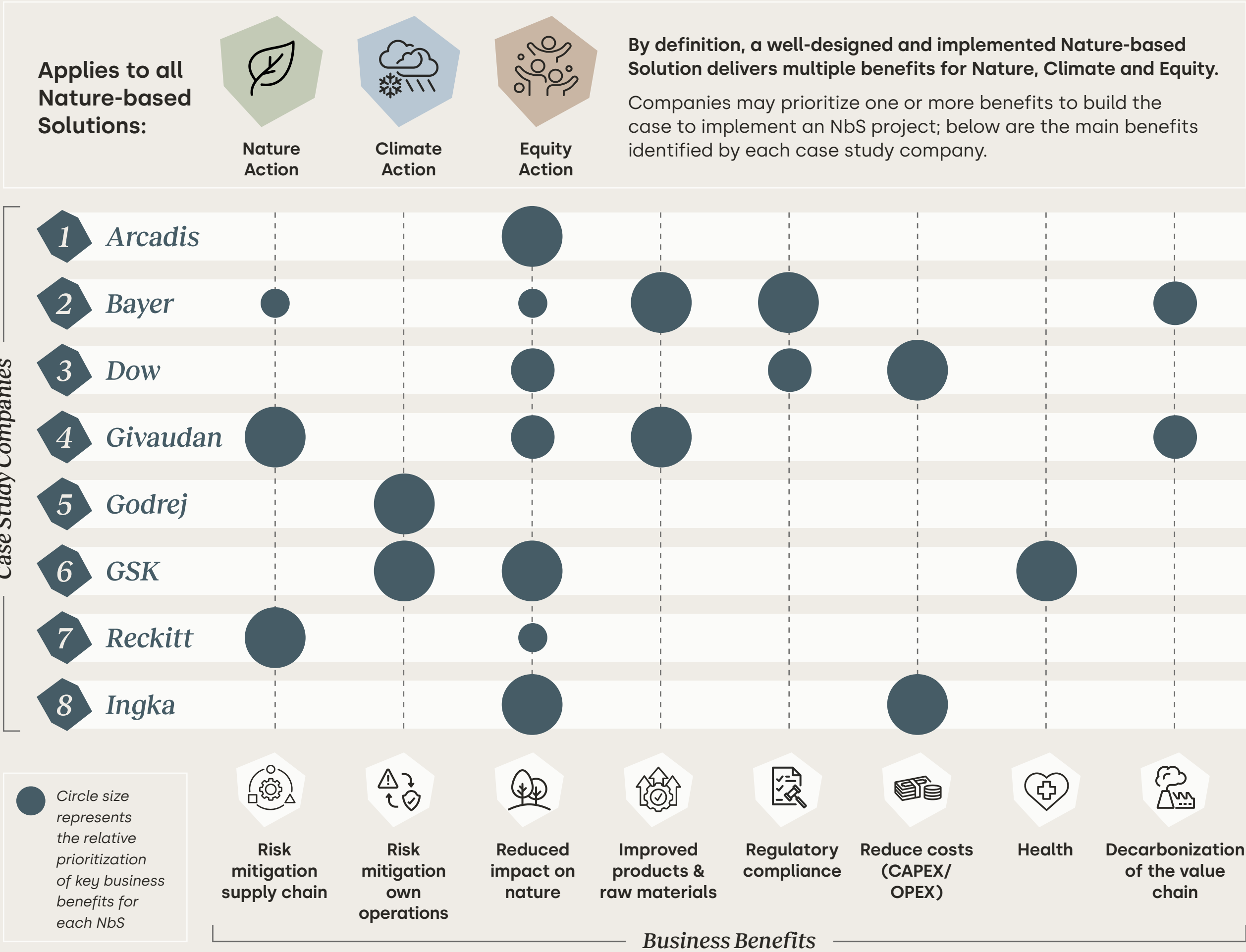
3.1 Establish full range of benefits

Stages 1 and 2 of the Blueprint have shown how NbS can address one or more specific business challenges and/or opportunities. **However, companies must also broaden their benefits “scope” to look for additional value arising from the NbS activity.** Expanding the scope will help identify outcomes that are of interest to the business but not necessarily part of the priority challenges/opportunities listed in Stage 1.

The Blueprint case studies demonstrate how broadening the benefits scope can incorporate a wide range of benefits, beyond addressing the initially-identified business challenge/opportunity. Figure 6 provides an overview of how each case study company identified one or two primary business benefits, as well as the potential of the NbS to generate additional value.

By broadening the benefits “scope”, companies can build an initial “portfolio” of project benefits for each solution they are considering, capturing the full range of positive impacts that the solution can deliver. To start, companies can draw from the indicative list of 20 different benefits provided in the Solutions Map, shown in Table 2 (page 21).

Figure 6: Range of business benefits identified in NbS Blueprint case studies



Building a business case for NbS
→ *Stage 3: Collect information on overall benefits and trade-offs from the chosen NbS*

As a next step in building out the benefits portfolio, companies should then include:

- benefits identified by the key partners and stakeholders in the early-stage stakeholder engagement process;
- key benefits from the landscape around the NbS;
 - benefits will arise from (or occur) well beyond the physical boundaries of the activity, but these can often be identified by examining both the area of the NbS intervention and the full landscape around it
 - as an example, the GSK case study shows how the use of an NbS that results in cleaner water is also delivering improved health outcomes for local communities
- projected benefits during and after the activity timeline;
 - forecasting tools (such as scenario planning) can help companies account for potential future impacts, both negative and positive
 - examples from the case studies include Bayer improving long-term supply chain resilience by stabilizing agricultural yields year to year, and Reckitt maintaining local workforces by creating long-term economic opportunities that reduce the impact of urbanization
- benefits from other relevant resources (see callout on additional resources below).

A similar exercise should be carried out for the traditional solutions/approaches available, to create a comparable list for all options. Doing this will allow companies to more effectively compare the case for the NbS option(s) and traditional solutions in Stage 6.

Table 2: List of NbS business benefits from the Nature-based Solutions Map

New & improved raw materials, products and services	Climate adaptation
Cost reduction	Avoiding/reducing nature impacts and/or dependencies
Increased asset value	Restoring/regenerating natural ecosystems
Resilience of operations and supply chain	Flood management
Regulatory compliance	Managing water stress
Social licence to operate and meeting consumer expectations	Water treatment
Increasing brand value and equity	Employee engagement
Increasing circularity	Improving supplier livelihoods
Emissions avoidance/reduction	Economic development for local communities
Emissions removals	Human health & well-being



Additional resources with lists of NbS benefits

- **AgEvidence** (for Agricultural NBS and best management practices), The Nature Conservancy
- **Agricultural NBS literature review**, The Nature Conservancy, Food and Agriculture Organization
- **IUCN typology of NbS**, as reported by Anderson & Gough
- **National Water Retention Measures**, Office International de l'Eau, ACTeon, IMDEA WATER, IACO, REC, REKK inc., BEF, SLU, ENVECO, SRUC and AMEC
- **NBS Evidence Platform**, Nature-based Solutions Initiative, University of Oxford
- **NbS Benefits Explorer**, CEO Water Mandate
- **NCS Health Toolkit**, Pollination, GSK
- **Water quantity impacts of NBS/NBS for sanitation**, The Nature Conservancy, Wildlife Conservation Society, National Center for Ecological Analysis and Synthesis

Building a business case for NbS

→ Stage 3: Collect information on overall benefits and trade-offs from the chosen NbS

3.2 Identify full range of trade-offs

Every solution – NbS and traditional alike – requires the balancing of different benefits and drawbacks to deliver the best overall outcome. While teams work their way through building a portfolio of project benefits, they must also consider the consequences of any of the activities or actions associated with delivering the NbS. The impacts could be inherently negative – such as a loss of biodiversity – or a trade-off of positives, in cases where one benefit comes as a result of partially reducing another positive impact.

In order to establish the trade-offs of the NbS being considered, companies should walk through a similar process to benefit identification, applying the same “broader scope” thinking to seek out potential negative impacts such as:

- Drawbacks or losses to the company;
 - by reviewing how the NbS affects both the original priority challenges and opportunities (in Stage 1) as well as the business’ impacts and dependencies on nature
- trade-offs impacting local stakeholders and the landscape around the NbS;
 - by consulting key stakeholders and local experts
- projected impacts during and after the NbS timeline;
 - by forecasting and reviewing scenarios, again with local stakeholders and experts.

The next part of this process is balancing the trade-offs and mitigating negative impacts as much as is possible. In Principle 5 of the *Principles of integrated capitals assessments*,³³ the Capitals Coalition outlines how companies can manage trade-offs once they have been identified. It suggests applying the mitigation hierarchy to address the issue(s): where the impact cannot be avoided, the next step is to reduce it, and as a last resort companies may consider compensating in an appropriate way.

In the same set of principles, the Capitals Coalition also recommends that each part of the trade-offs assessment process, from identifying impacts to defining mitigation plans, is undertaken together with relevant stakeholders – ensuring that the best overall outcomes are achieved consistently. As with the benefits identification process, companies can carry out a parallel trade-off assessment for the traditional solutions under consideration. This will generate comparable information on all available options.



3.3 Evaluate benefits and trade-offs

Once the relevant benefits and trade-offs have been identified, the next step is to assess their impact quantitatively for both the business and other stakeholders involved. *Benefit Accounting of Nature-Based Solutions for Watersheds Guide Version 2³⁴* offers useful guidance on this topic, specifically in Sections 3 and 4 of the guidance. The starting point is the “Total Economic Value” model depicted in Figure 7.

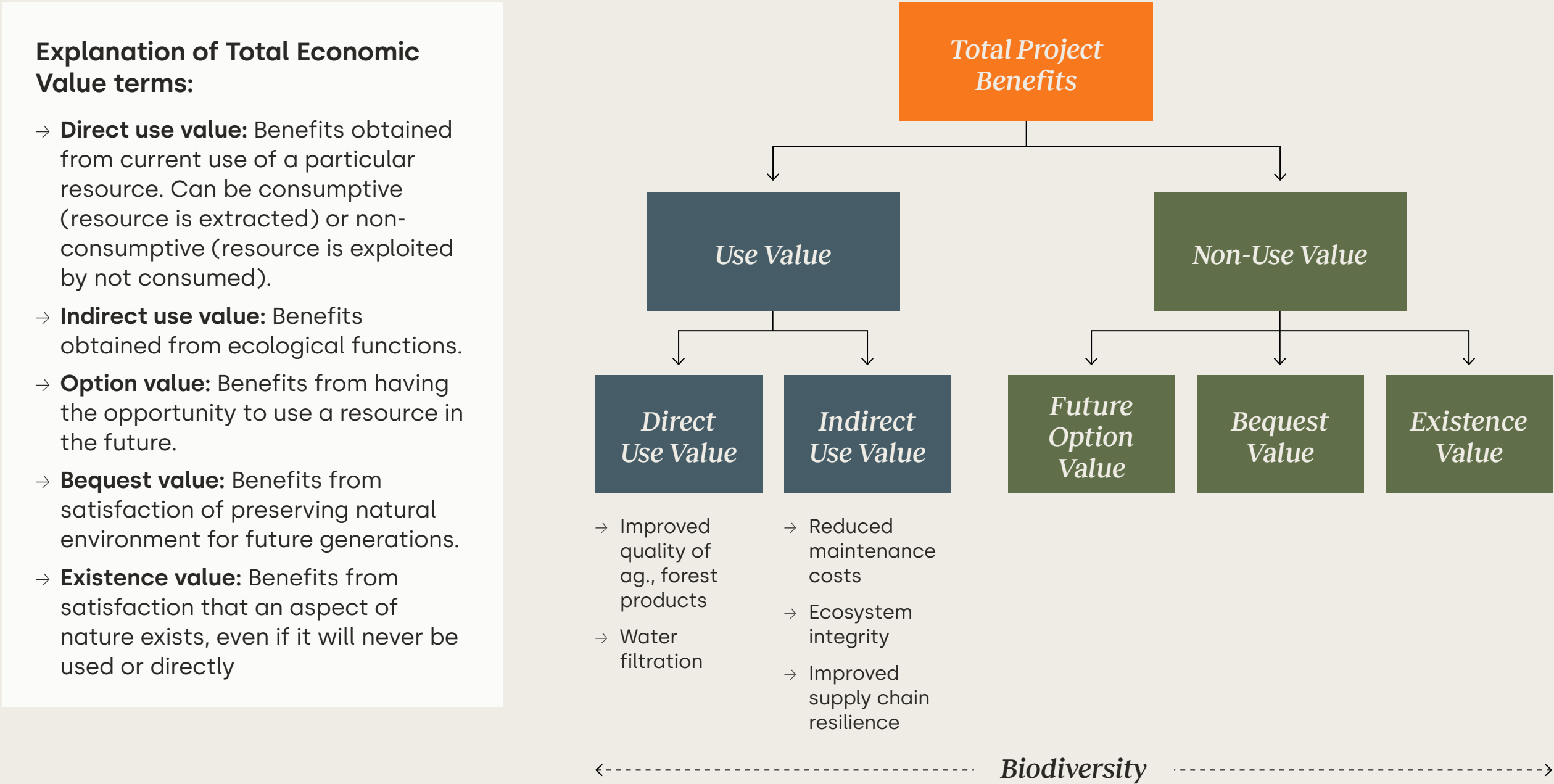
Companies can use this structure to arrange the benefits and trade-offs identified in Sections 3.1 and 3.2 above.

Next, companies should use (or build, if necessary) tools and frameworks to organize and standardize their methods for quantifying and evaluating benefits – translating intangible or difficult-to-define ecosystem benefits into usable metrics. Measuring the impacts and benefits of an NbS intervention in this way is crucial to its success, allowing companies to monitor NbS value throughout implementation, communicate NbS benefits, and further strengthen the business case.

The Blueprint case studies from Bayer, Dow, GSK and Reckitt all reference specific tools used in this process. Bayer and Reckitt designed bespoke approaches with key partners and experts; Dow helped develop the [Ecosystem Services Identification & Inventory Tool](#), and GSK references the [WRI Volumetric Water Benefits Accounting methodology](#). Risk management and (re) insurance valuation processes can also provide a starting point for risk-related benefits and trade-offs.

A table of additional tools and frameworks is available in Appendix A. Furthermore, *Benefit Accounting of Nature-Based Solutions for Watersheds* lists specific indicators and calculation methods for a range of NbS outcomes and these are summarised in Appendix B of this guidance.

Figure 7: Breakdown of the Total Economic Value framework (adapted from CEO Water Mandate, 2023)



Stage 4: Develop an initial design for the chosen NbS

Once the full extent of the NbS benefits and their value to the business is clear, companies can draw up a preliminary design of NbS activities that will deliver these benefits.

Why do this?

The objective of this stage is to guide companies through the first design of the NbS, recognizing factors and processes specific to NbS that may not appear in a standard business case.

Blueprint users complete this Stage by working with stakeholders and using existing resources and guidance from organizations such as IUCN, Verra and CEO Water Mandate to generate an outline of the proposed NbS.

This stage contains two elements:

4.1: Establish stakeholder involvement in NbS design

4.2: Outline the NbS design and implementation plan

4.1 Establish stakeholder involvement in NbS design

NbS delivery is often influenced by factors that are project-, sector-, biome-, location- and/or company-specific. As a result, creating an initial project outline will need support and input from experts and key stakeholders.

The *Stakeholder Engagement Guidance for Nature-Based Solutions*³⁵ gives specific guidance for NbS project design, recommending:

- assigning stakeholder roles and responsibilities;
 - using the stakeholder map prepared under Stage 3 of this guidance (example shown in Figure 4), allocate suitable stakeholders to work on design elements such as planning, operations and governance
- collaborating on design decisions;
 - co-creating the NbS design is an important approach for ensuring local stakeholder buy-in – the activities should not be devised solely by any one stakeholder, including the company itself
- resolving a final draft of the design that is approved by all key actors involved;
 - a fundamental part of this process is reviewing the planned actions with relevant stakeholders and validating the benefits and trade-offs identified in Stage 3 of this guidance.

4.2 Outline the NbS design and implementation plan

As a starting point for the NbS design, teams should consult the IUCN *Global Standard for Nature-based Solutions* (and associated guidance,³⁶ tool³⁷) to ensure that they are incorporating lessons learnt from previous NbS implementation efforts. The eight criteria of the Global Standard are:

1. NbS effectively address societal challenges;
2. NbS design is informed by scale;

3. NbS result in a net gain to biodiversity and ecosystem integrity;
4. NbS are economically viable;
5. NbS are based on an inclusive, transparent, and empowering governance process;
6. NbS equitably balance trade-offs between achievement of the primary goal(s) and the continued provision of multiple benefits;
7. NbS are managed adaptively, based on evidence, and
8. NbS are sustainable and mainstreamed with an appropriate jurisdictional context.

With these criteria and stakeholder engagement practices in mind, the next step is to outline the NbS activity itself, how it will be delivered, and what its intended outcomes are in a project description document. Below is an example of a description template (adapted from Verra³⁸), mapped against the eight IUCN criteria above, highlighting the elements of the initial design and where they are connected to the Global Standard for NbS.

Using these three resources (from IUCN, Verra, and CEO Water Mandate), companies can structure and assess their initial design and implementation plans. This practical information on what is proposed and how it will be delivered is an important element in developing the NbS cost estimates.

Building a business case for NbS
→ *Stage 4: Develop an initial design for the chosen NbS*

Table 3: Combined project outline template (adapted from Verra, IUCN)

<i>Project description document section/heading</i>	<i>Short description</i>	<i>IUCN</i>	<i>Criteria</i>
Summary description of the project	Summary of the project activities, motivation, and intended impacts	N/A	N/A
Project design (single activity, multiple instances of a single activity, group of activities, etc.)	Brief outline of activity structure and any grouping/interaction between elements of the activity (e.g. a single localized NbS, a collection of different NbS activities all contributing to the same outcomes)	N/A	N/A
Project proponent(s)	Entities driving the project	5	Inclusive governance
Other entities involved	List of participants and key stakeholders	5	Inclusive governance
Ownership	Evidence of project ownership and accountability	5	Inclusive governance
Start date and duration	Information on project start and timeline	N/A	N/A
Project scale and location	Size and scope of project initially and on completion	2	Design is informed by scale
Initial description of project activities	Description of the activities proposed, where each is to take place, how it will achieve its intended impact, and the roles/responsibilities of any stakeholders involved	1, 2, 3	Address societal challenges; design informed by scale; biodiversity net gain
Conditions before project start	Description of the existing conditions in and around the project area, including the ecosystem type, current and historical use of the ecosystem/land	1	Address societal challenges
Compliance with regulatory requirements	Identification of major regulatory requirements relevant to the project, and demonstrate compliance	5, 8	Inclusive governance; sustainable and legal
Safeguards	Consideration of key safeguards including no net harm, risks to local stakeholders, potential environmental impacts, public feedback and comments	6	Balance trade-offs
Stakeholder engagement	Outline of stakeholder engagement process including initial mapping, outreach, expected impacts and benefits, willingness to pay for ecosystem services, communication and feedback mechanisms	5, 7	Inclusive governance; adaptive management
Impacts of the project and quantification methods	Outline of expected impacts and how these will be managed, detailing how impacts will be quantified (including how baselines can be set)	1, 3, 4, 7, 8	Address societal challenges; biodiversity net gain; adaptive management; sustainable and legal
Monitoring and evaluation processes	Description of data and parameters fixed at project start, data and parameters that will be monitored, and outline of monitoring plan (e.g. processes used to capture, process, and use information)	1, 3, 4, 7, 8	Address societal challenges, biodiversity net gain, adaptive management,sustainable and legal

Stage 5: Estimate costs of the proposed NbS

With a clear outline of what work needs to be done, the next step in the process is to develop a breakdown of the costs involved. This can take the form of a high-level estimate for initial consideration, or a more detailed itemized breakdown as needed.

Why do this?

The objective of this stage is to guide companies through the preliminary estimation of NbS costs.

Blueprint users complete this stage by using reference data to generate an initial range of potential overall costs, confirming the cost categories likely to be required and refining the estimate for each category using available local data.

It is important to note that NbS costs vary widely, and depend heavily on contextual factors. As a result, generating initial high-level estimates of project costs is difficult. The World Bank report *Assessing the Benefits and Costs of Nature-Based Solutions for Climate Resilience: A Guideline for Project Developers*³⁹ suggests starting with “value transfer”, using the unit costs of comparable projects to estimate the cost of the NbS being considered.

Businesses should use information from projects that expert partners or stakeholders are already aware of where possible. Some tools, such as the NbS Benefits Explorer,⁴⁰ WaterProof⁴¹ and Sustainable Asset Valuation,⁴² may offer useful valuation data. Alternatively, there are

datasets available for review for some common NbS types; several are collected in Table 4 below. For other NbS types, companies should search for specific projects in similar situations and use the value transfer method. This will generate preliminary estimates, often as a range of possible prices. Companies can use these database values for order-of-magnitude estimates.

Table 4: High-level cost estimate data for specific NbS types

NbS type	NbS activities listed	Region	Reference implementation costs (USD)	Per unit area
Agroforestry ⁴³	Silvoarable agroforestry	UK	1158-1926	ha
	Silvopastoral agroforestry	UK	642-1070	ha
	Hedgerows	UK	453-4030	ha
Coastal protection/ resilience ⁴⁴	Coral reef restoration	USA	2-4790	m2
	Oyster reef restoration	USA	107-316	m2
	Salt marsh restoration	USA	100-330000	ha
	Mangrove restoration	USA	500-64300	ha
Forest restoration ⁴⁵	Forest and landscape restoration	Ethiopia, Madagascar	87-1445	ha
Peatland restoration ⁴⁶	Mix of ditch blocking, peat restoration, bunding, forest to bog restoration, and scrub removal	Scotland	1712	ha
Ecosystem restoration ⁴⁷	Protection of degraded ecosystems to allow passive regeneration	USA	2778	ha
	Active regeneration of degraded landscapes	USA	8218	ha

The next step is to review the design plan (as outlined in Table 3 on page 25) and assign cost estimates to each item and/or activity included. Expert partners and key stakeholders will be able to provide preliminary information relevant to the project area, which should be incorporated wherever possible. At this point, it may be useful to review existing NbS cost breakdowns to ensure that all appropriate costs are included; an example of a typical NbS cost breakdown is shown in Figure 8 for reference.⁴⁸

Finally, as most NbS affect entire landscapes, companies looking to use NbS will need to design and deliver activities outside their operations and across their entire value chain. This could push business actors out of their usual comfort zone as it means that instead of having full control over all activities involved, companies will be delivering the NbS alongside the range of stakeholders and the ecosystem itself. This change in role demands new and/or different skillsets for staff charged with leading the company’s NbS activities. Companies should review internal capacity to undertake: stakeholder engagement (ranging from communities on the ground, up to major organizational partnerships), NbS project management; and, long-term monitoring of the NbS and its outcomes. This review will indicate whether to either upskill existing staff, hire new team members or outsource as needed. This must be factored into any cost estimates, once again starting with value transfer and refining with local information as it becomes available.

Figure 8: NbS cost categories for collective action watershed programs (Kang et al., 2023)

Grouping	Major activity category	Examples of activities included
Administration & transaction costs	Stakeholder outreach	→ Stakeholder identification and outreach (incl. surveys, interviews, visits) → Coordination with program partners → Partner enrollment and management
	Legal services	→ Institutional, legal, and policy analyses/studies → Contracts preparation and management → Legal processes required for program establishment → Enforcement of contracts in case of non-compliance
	Technical analyses	→ Biophysical analyses and modeling → Socio-Economic analyses → Business case analysis (return on investment; cost-effectiveness) (Includes field visits, focus group meetings, surveys, expert consultations)
	Program management	→ Program strategy design, fundraising, administration → Training and capacity building workshops that program staff participate → Landowner enrollment (selection, engagement, contract negotiations, etc.)
	Communications	→ Marketing, outreach materials, web materials; internal and external reporting → Event organization
	Monitoring	→ Hydrologic, biodiversity, or socioeconomic monitoring → Landowner compliance monitoring → Data management → Contract design, implementation, and maintenance of monitoring system → Impact evaluation
Intervention costs	Interventions implemented by program	→ NbS intervention costs borne by program for directly implementing NbS or for assisting landowners in implementation → Design and planning, equipment, materials, maintenance, technical assistance to landowners → Contracts to implement conservation activities
	Payments (cash or in-kind) to landowners	→ Payments (cash or in-kind) to landowners and/or communities for implementing agreed-upon interventions → Cost of purchasing and delivering in-kind support to landowners/communities
Other	Other	Anything not falling under categories above

Building a business case for NbS
→ *Spotlight: piloting NbS and creating proof of concept*

Spotlight: piloting NbS and creating proof of concept

NbS are often novel, complex activities for companies to support. Running pilots and establishing a proof of concept can help with testing feasibility, confirming sources of added value, and embedding the role of NbS within the company's climate and nature transition plans.

Companies can start with pilots from as early as Stage 2 (exploring relevant NbS) to demonstrate that the chosen NbS will deliver what is needed. In the Givaudan case study, the team set up a demonstration regenerative guarana farm to test best practices, proving to the company that the NbS activities would help meet core business imperatives such as increasing supply chain resilience. Givaudan is now reiterating this approach of piloting and scaling up regenerative agriculture models in other sourcing regions and supply chains.

Companies should use trial runs for Stage 3 (identify benefits and impacts from the chosen NbS) and Stage 4 (design and cost estimates). In Stage 3, model/pilot programs are powerful tools for confirming the benefits identified (or correcting them), and adding potential sources of value not captured by desk research and initial stakeholder consultation. Similarly, in Stage 4, piloting the NbS will generate valuable information about project design and delivery, which can be used to refine the initial cost estimates.

In the INGKA Group case study, the company is using the NbS project at an INGKA site in Romania to test the impact of wildgarden restoration on local biodiversity alongside the expected savings on garden maintenance. In running this pilot, Ingka has established that there is significant additional benefit for the staff and customers using the store. The costs and benefits data this initial project is generating can be used in the project design and cost estimations for future wildgarden restorations. In this instance, the pilot has contributed to both Stages 3 and 4 of the business case build.

Finally, pilot programs do not need to be tied to NbS business cases to begin with; proofs of concept can be an outcome of voluntary action to support local ecosystems and/or communities. In the Godrej case study, the company started with a philanthropic initiative using NbS to deliver benefits to local communities and biodiversity in the same landscape as one of its facilities. This built internal capacity to use NbS for future challenges and opportunities, equipping Godrej to apply NbS to reduce water stress in the Nashik river basin thereafter.



Stage 6: Compare NbS options to other solutions across full range of benefits and costs

At this stage, the company is equipped with:

1. a clear picture of its business challenges and opportunities;
2. an appropriate NbS to deliver against selected challenges and opportunities;
3. an outline of the benefits and trade-offs expected from the selected NbS; and
4. an initial estimate of the costs involved in delivering the NbS and its benefits.

The final element of building this business case is rational, weighing up the benefits and costs of each available course of action.

Why do this?

The objective of this stage is to generate the initial argument for the best solution to the business challenges/opportunities outlined in Stage 1.

Blueprint users complete this stage by using a multi-criteria decision analysis tool and the information generated in Stages 3-5 to select a solution (NbS or otherwise) based on the most important elements of the benefits portfolio, trade-offs and cost estimates.

With comparable information for the solutions being considered, companies must weigh up the benefits and costs of each approach. For this final stage of the business case process, a decision-making tool may be useful in selecting the most beneficial solution overall. One example that companies can use is "Decision Matrix Analysis", which requires:

1. the list of potential solutions being considered (see Stage 2 of this guidance);
2. the key criteria for deciding between the solutions (derived from Stages 3 and 4 of this guidance);
3. a relative weighting of each criterion (which will have to be developed for each case, using company priorities, context-specific factors such as costs, and impacts on stakeholders), and
4. how each solution performs against each criterion (using information from Stages 3 and 4 of this guidance).

By multiplying each solution's performance score against the weight of the relevant criterion, this analysis generates an overall score for each solution, indicating (by weighted average) which approach best fits the criteria that the company deems most important. An illustrative example of this, using some of the factors from the Dow case study (see Figure 9 on page 30) is detailed below.

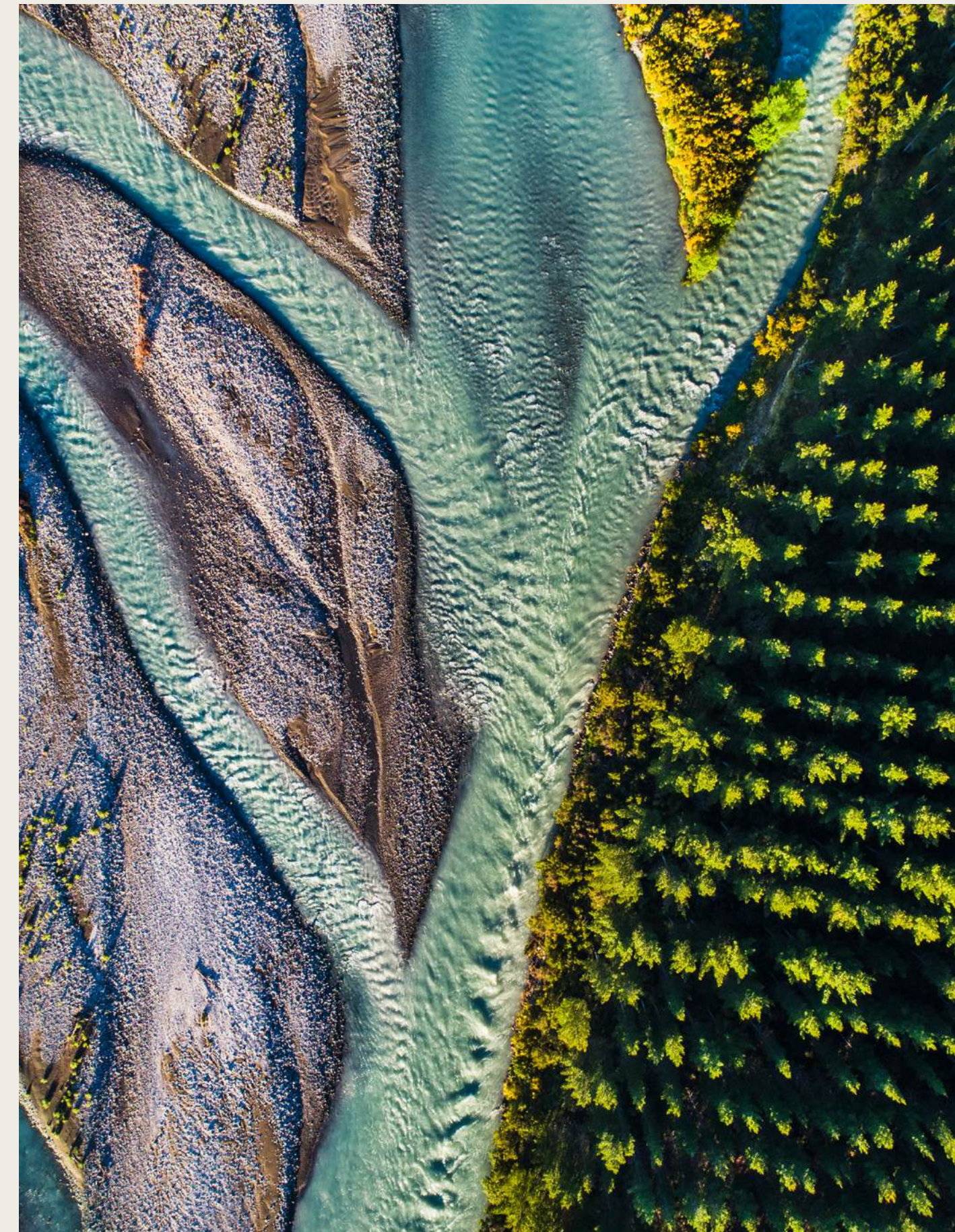
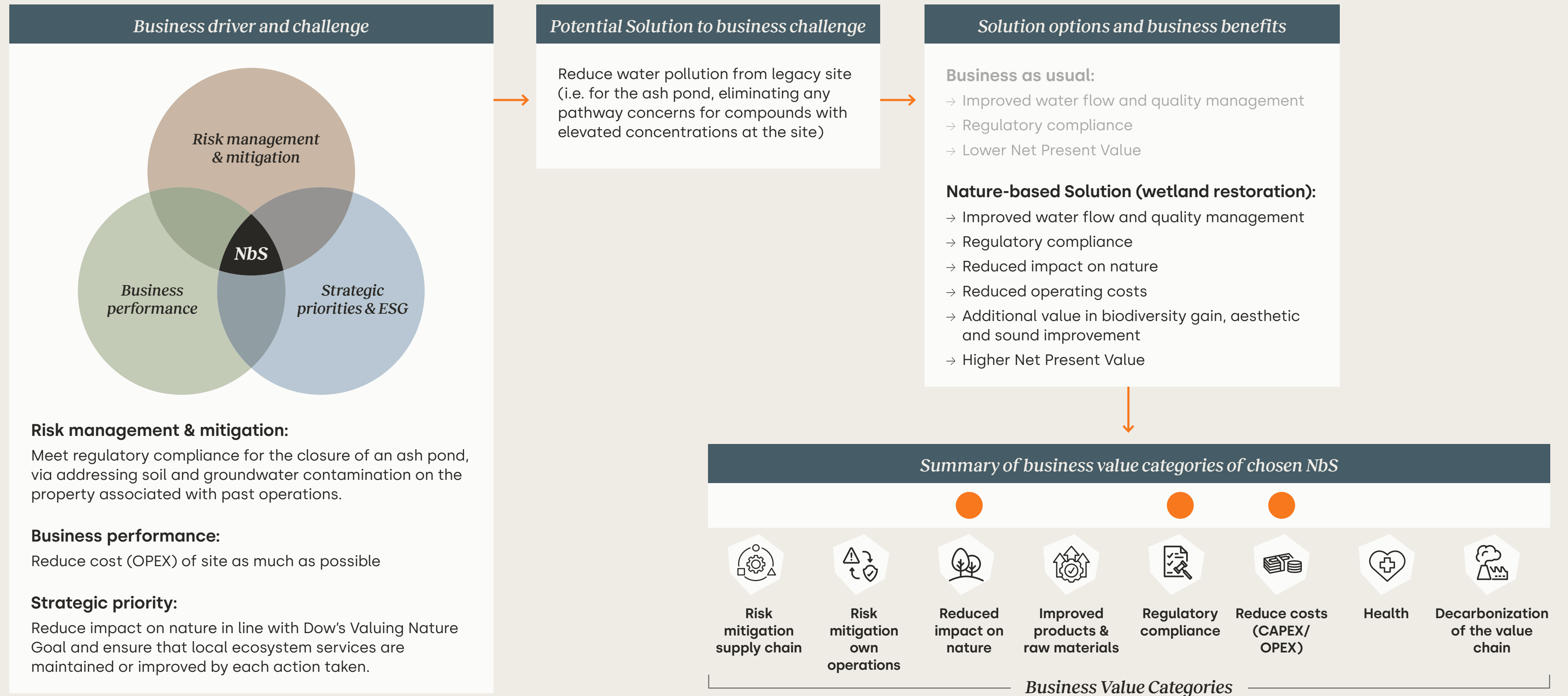


Figure 9: Outline of Blueprint case study from Dow, showing comparison of business-as-usual and NbS options



By multiplying each solution's performance score against the weight of the relevant criterion, this analysis generates an overall score for each solution, indicating (by weighted average) which approach best fits the criteria that the company deems most important. An illustrative example of this, using some of the factors from the Dow case study (see Figure 9 on page 30) is detailed below.

Decision Matrix Analysis using parameters from Dow case study

1. List the solutions:
- traditional engineered solution: a "cap" for the ash pond

– NbS approach: ash pond excavation and riverine wetland restoration.
2. List the key criteria:
- meet regulatory requirements;

– reduced OPEX for the site;

– manage local water quality, and

– reduce impact on nature.

3. Assign relative weight to each criterion:*
- regulatory requirements – mandatory, if the solution does not meet this it is not considered;

– reduced OPEX – 35% (example value);

– manage local water quality – 45% (example value); and

– reduce impact on nature – 20% (example value).
4. Map solutions in a Decision Matrix and assign a score for each solution against each criterion, then multiply and add to generate final scores:

This example results in the NbS approach being selected, as it performs better overall against the chosen criteria (despite a lower performance in water quality).

At the end of this process, companies will have carried out a balanced comparison of a far wider range of costs and benefits for each available solution, traditional and NbS. Using the NbS Blueprint and Solutions Map, and following the examples in the case studies, a company can capture the business and societal benefits of each approach and build a much stronger business case for whichever solution works best overall.

<i>Solution\\ criteria</i>	<i>Meet regulatory req.s</i>	<i>OPEX for the site</i>	<i>Manage local water quality</i>	<i>Reduce impact on nature</i>	<i>Overall scores</i>	<i>Score</i>
<i>Criterion weighting</i>	<i>Required</i>	<i>35%</i>	<i>45%</i>	<i>20%</i>		
<i>Solution 1 (engineered "cap" for the ash pond)</i>	Achieved	20% (OPEX relatively high)	80% (water quality high)	0% (minor negative impact)	(0.35*0.2)+(0.45*0.8)+(0.2*0)	43%
<i>Solution 2 (NbS – excavation and wetland restoration)</i>	Achieved	80% (OPEX relatively low)	60% (water quality acceptable)	80% (positive impact)	(0.35*0.8)+(0.45*0.6)+(0.2*0.8)	71%

Note: *The criterion weighting values used here are indicative, not based on case study data.

04. Conclusions *and next steps*

Nature-based Solutions, when designed and delivered well, can deliver business benefits as well as addressing societal challenges. This is not always evident; it can be difficult to articulate the value that NbS offer to companies, even when the societal case is strong.

The NbS Blueprint case studies demonstrate how eight companies used expanded business case processes, creating new approaches that allowed each to incorporate the broader range of positive impacts that NbS offered, to the business and beyond.

Building on those experiences, the NbS Blueprint lays out a six-stage process for companies to follow that will enable the building of strong initial business cases for using Nature-based Solutions. A company that uses this process will be able to identify and communicate the value of NbS as solutions to its own business challenges and opportunities, building stronger justifications for investing in activities that bring value to the business, while contributing to sustainability imperatives such as climate, nature and equity action.

This Blueprint provides the foundations for an acceleration in the consideration and implementation of NbS to both tackle business challenges and contribute to net-zero, nature-positive and equity strategies. To support this, WBCSD is, with members of its Nature Action imperative, now turning its focus to the practical aspects of NbS delivery for companies, exploring:

- where NbS can address priority actions to halt and reverse nature loss for specific value chains;
- the metrics that can demonstrate the climate-, nature- and equity-positive impacts of NbS; and
- the innovations and strategies needed to direct investment towards NbS.

The objective of the next phase of this work is to steer companies towards impactful, valuable NbS activities that are implemented in the near-term.

Nature-based Solutions have a significant role to play in achieving Vision 2050, a world in which more than 9 billion people live well, within planetary boundaries by mid-century. NbS can also help companies to transform themselves. Recognizing this dual capability is the key to unlocking NbS's full potential as a powerful solution set to deliver for climate, nature, equity and business ambitions, at scale.



NbS Blueprint *Case Studies*

Arcadis: *Coastal ecosystems restoration in The Netherlands*

Value drivers

- Risk management & mitigation
- Strategic priorities & ESG

NbS type

- Ecosystem restoration

Corporate strategy connections with NbS

- Develop the growing market for Nature-based Solutions (NbS) in Europe, Australia and the U.S. (e.g. for risk management. With 70% of the Dutch GDP being produced in areas below sea level, Arcadis actively aims to play a role in mitigating the risks).

Challenge

- Significant loss of biodiversity and local species in the artificial lake created by two important dikes

Opportunities

- Increase biodiversity and resilience by creating a wildlife nature reserve
- Collect important information and data on sandy shores that can be applied to other cases



Context

The Marker Wadden Islands are the largest constructed islands in Europe. They were established to increase biodiversity in a manmade freshwater lake landward of the Afsluit and Houtrib dikes. These dikes were built for flood protection and reduced the natural water variations of the Lake IJssel, causing much of the wildlife to disappear. Arcadis was involved in planning the structure and design of five new islands for a total of 1,000 hectares of new landmass. The islands are constructed using sediment present in the lake, with sand and clay, structured to provide protection for swamplands and to attract fish and other wildlife. The outer boundaries of the islands consist of sandy dams. The project was funded by a Dutch wildlife conservation organization and a Dutch ministry.

Additional sources of value:

- Increased biodiversity (flora & fauna) that had nearly disappeared from the area
- New research area: islands form a living laboratory for the development of new natural systems
- Educational purposes and recreational activities
- Creation of shores and archipelagos that support the establishment of wildlife and new habitats
- Partial restoration of Lake Markermeer as a Nature 2000 site

Tools:

- Results of the pilot experiment in which the application of sandy shore in lake environments was studied
- Numerical models for waves/currents and silt transport

Project evaluation / project metrics

- +1000ha of land created
- Increases in key species, local bird and fish populations

Project partners:

Natuurmonumenten (Dutch Society for Nature Conservation); Rijkswaterstaat (the executive agency of the Ministry of Infrastructure and Water Management) Boskalis, Wteteveen+Bos, Vista

Duration:

- 2016 Preliminary work started
- 2021 First five islands
- 2023 Last two islands

NbS Blueprint case studies

→ *Arcadis: Coastal ecosystems restoration in The Netherlands*

Arcadis case study: context and additional information

Arcadis and NbS

- Arcadis is investing in its own capability to meet growing market demand for NbS and biodiversity projects in Europe, especially the United Kingdom, Netherlands, Australia and the U.S. In addition, NbS is playing a vital role in achieving the company's goal of integrating nature and biodiversity into business operations.
- Arcadis views NbS as an important way of improving climate resilience in cities, reversing biodiversity loss, and reducing carbon footprints. Arcadis acknowledges that it is not always possible to choose an exclusively nature-based solution; compromises must be made to ensure that climate-related solutions are as integrative as possible and address multiple issues at once, benefitting nature, society and economy.

Climate adaptation challenges for NbS

Arcadis views NbS according to the different climate challenges it can tackle: flooding, heavy rain, wildfires, heat stress, drought, biodiversity loss / ecosystem degradation.

Flooding: Dutch Coastlines Design

- The Netherlands, with 70% of its GDP being produced in areas below sea level, must be constantly aware of flooding risk. Studies in 2003 revealed that the Dutch North Sea coastline with its extensive stretches of dunes and dikes needed further strengthening to maintain the desired protection levels (with the ambition to withstand a superstorm as extreme as once in 10,000 years).
- The Dutch Government started the reinforcement of coastal "Weak Links", and Arcadis was one of the partners involved in the planning, engineering, coastal morphology investigation, scenario analysis, environmental assessment and archaeological assessment required.
- Arcadis uses NbS to mitigate flooding risks not only in the Netherlands but also in the U.S. (e.g. Louisiana Coastal Area Beneficial Use of Dredged Material).



Bayer: Sustainable agriculture in Brazil



Value drivers

- Risk management & mitigation
- Business performance
- Strategic priorities & ESG

NbS type

- Regenerative agriculture

Corporate strategy connections with NbS

- Strengthen supply chain engagement by connecting partners with research institutions, farmer associations and other industry participants
- Improve economic performance
- Deliver climate action by reducing GHG emissions
- Transform farming to regenerative agriculture

Challenge

- Reducing GHG emission footprint while transforming the existing farming system and improving farmers' livelihoods

Opportunity

- Work on soil health while increasing yield

Context

Bayer has established the *PRO Carbono* program to support farmers transitioning toward more sustainable management of their land. According to prior field trials, successful implementation of the program would result in increased productivity and decreased environmental impact. The approach started with testing solutions regionally and investigating a broad range of relevant metrics and indicators before scaling up successful practices as part of the *PRO Carbono* program. The 3 key measures – extending crop rotation, inclusion of cover crops, and no-till management – are baselined so that progress can be tracked.

While the initial focus was on improving economic performance, it quickly became clear that measures that improved yield could also contribute positively to soil stability and other ecosystem services, illustrating that economic and nature-related objectives can align and reinforce one another. Within this program and its broader business activities, Bayer has the chance to work closely with farmers through multistakeholder initiatives and expert organizations to generate more sustainable outcomes. The program has provided a learning opportunity and supported the broadening of Bayer's sustainability approach, identifying the key role that regenerative agriculture plays in transforming agriculture systems.

Additional sources of value:

- Improved livelihoods for local farmers (e.g. higher incomes)
- Increased soil health (e.g. increased soil organic matter and microbial activity)¹
- Reduced soil erosion from wind and water¹
- Improved water and air quality¹
- Increased habitat for wildlife¹

Tool:

- Bespoke tool development

Project evaluation/project metrics:

- (Most metrics measured were preparatory steps to inform agricultural method for the *PRO Carbono* program)
- Productivity (increased output/yield) & yield variability
 - Profitability (% gross margin and % return on investment) & temporal variations
 - Environment/soil (carbon, water and nutrient balance, environmental impact reduction of chemical crop protection, GHG emissions, soil organic carbon and other physical, chemical and biological soil properties)

Project partners:

Universities, research institutions, external consultants & advisors, farmers associations, other companies/ startups, internal collaborators and local farmers

Duration:

Started as a local initiative in ~ 2014 and has since grown into a regional (LatAm) and global programme

Resources:

¹[Reduced Tillage Systems are a Key Component of Sustainable Agriculture, Soil Health and Mitigating Climate Change \(bayer.com\)](#) for general perspective, and partially investigated locally

Context and additional information

PRO Carbono Management and related Research & Development efforts

- Bayer is actively working on a methodology for setting up and improving agricultural practices that combine environmental and economic indicators. The environmental factors considered are: resource use efficiency; carbon, water and nutrient balance; environmental impact reduction of chemical plant protection products; soil evolution and evolution of pests, diseases and weeds. The economic factors considered are: grain yields; system productivity; yield risk and variability, and economic return.
- The management approach was tested in strip and regionalization trials before being upscaled to 1,800 farmers in Brazil and 130 farmers in Argentina as part of the implementation of the PRO Carbono program.
- A key assumption is that beneficial performances during strip and regionalization trials are likely also beneficial when scaled up, though currently only partially tracked. Outcomes measurement is a work in progress and will evolve over the coming years. This depends in part on possible reduction of costs associated with measuring specific metrics.
- Recommended practices included:
 - **No Tillage:** [increase stover intake and do not revolve the soil]

- **Cover Crops** [additional non-commercial crop for soil conservation] and/or crop rotation [adopt rotation of winter or cover crops]
- **Productivity & Carbon Boosters:**
 - Adopt high-performance genetics & biotechnology
 - Optimize the use of fertilizers and correctives
 - Nitrogen Smart management
 - Precision agriculture adjusting plant density and fertilizers by yield zone
 - Prescription
 - Implement crop protection based on monitoring

New strategic focus: Regenerative Agriculture

- Bayer considers regenerative agriculture an **outcome-based production model** with **soil health** and **increased resilience** at its core.
- Bayer commits to:
 1. reducing the climate footprint of farming,
 2. reducing the environmental impact of crop protection,
 3. enabling smallholder farmers and
 4. improving water use

- Regenerative agriculture also contributes to:
 - mitigating climate change through GHG emissions reduction and carbon removals,
 - maintaining or restoring biodiversity,
 - conserving water resources and
 - increasing yield and improving economic and social well-being of farmers
- Bayer is working with local partners around the world to support farmers in understanding and adopting regenerative farming practices by offering modular, rotational cropping systems, providing a range of agriculture innovations and adapting to farmers' needs.



DOW: Reduced OPEX cost through wetland restoration in Michigan, USA



Value drivers

- Risk management & mitigation
- Business performance
- Strategic priorities & ESG

NbS type

- Ecosystem restoration

Corporate strategy connections with NbS

- By 2025, deliver US\$1bn in Net Present Value (NPV) through business-driven projects that enhance nature

Challenge

- Close ash pond in line with state agency requirements and corporate nature goal

Opportunity

- Reduce long-term costs associated with the closure of a legacy site

Context

Dow had an ash pond in Michigan that had ceased operation in the 1980's and was set for closure. Connected to its corporate goals, the objective was to close this pond in a way that best reduced operating and maintenance costs and liabilities while meeting state agency requirements and enhancing ecosystem services. The solution was a 9ha functional wetland with recreational amenities that improved natural habitats along one mile of the riverfront. In addition to reducing operating costs, the wetland allows for improved stormwater control, which results in reduced floodwaters downstream.



Planned closure



Realized closure (Beyond Dow's restoring property)

Additional sources of value:

- Increased important ecological functions: improved air and water quality and water quantity control (which was the most evident ecosystem service the wetland provided)
- Improved biodiversity through habitat health
- Recreational opportunities and improved aesthetics

Tool:

- ESII Tool: environmental impact measured through performance on 13 ecosystem services and 20 engineering unit outputs. Able to compare the traditional closure method of "cap and treat" to restored wetlands. Providing this data facilitated the adoption of this non-traditional closure solution with Dow leadership and regulatory agencies

Project evaluation / project metrics:

- Ecosystem services performance of various closure methodologies (i.e. "cap and treat" vs functional wetlands)
- Net present value (NPV) of NbS solution versus business-as-usual scenario

Project partners:

The Nature Conservancy, EcoMetrix Solutions Group, AECOM, City of Midland, Michigan Department of Environmental Quality

Duration:

3-4 months to design alternatives

NbS Blueprint case studies
→ *DOW: Reduced OPEX cost through wetland restoration in Michigan, USA*

Context and additional information

Key metrics for nature at Dow

- As of 2022, nearly **77%** of the US\$1bn goal in NPV from business-driven projects that enhance nature by 2025 has been reached.
- Realized an NPV of **US\$129m** in 2022, bringing the total to US\$766m since launching the goal.
- A full **100%** of **capital projects screened** for potential benefits and impacts to nature, water, air, soil, land use and opportunities to utilize engineered natural technology.

How Dow sees NbS

- NbS represents additional value to business-as-usual scenario where the overall ecological footprint can be improved and more opportunities are created for the business.
- The nature goal set in 2015 as part of Dow's 2025 Sustainability Goals will create new value for Dow and for society by helping the company understand and value the benefits that nature can provide to the bottom line.

Lessons learned from implementing NbS

- Early development of the ESII tool helped make the impact measurable and was key in establishing the business case.
- NbS can offer numerous opportunities that initially may be hidden or unclear. There is potential to implement NbS in a wide range of projects and locations. The ESII tool helps DOW employees to identify these opportunities.
- It takes time for companies to recognize the full value of NbS and include nature in their decision-making processes. However, institutionalizing this supports implementation at scale.

Future outlook

- With a strong foundation, successful examples to follow and the right tools and processes in place, Dow now asks each new project whether it has considered NbS.
- Dow is already defining the next steps of its nature journey, engaging with TNFD and participating in the development of the **chemical industry's guidance document**.



Givaudan:

Mitigated supply chain risk and improved business and environmental performance in Brazil

Givaudan

Value drivers

- Risk management & mitigation
- Business performance
- Strategic priorities & ESG

NbS type

- Regenerative agriculture

Corporate strategy connections with NbS

- Ensure access to key input materials for products (resilient supply chain)
- Drive business performance and contribute to purpose ambitions and sustainability commitments

Challenge

- Reduce supply chain risk (upstream; materials/ingredients)

Opportunity

- Add to a framework for strategic supply development including NbS, mitigating nature-related risks in the supply of key raw materials

Context

Givaudan's products depend on nature-related inputs; as a result, Givaudan strives to mitigate nature-related risk within the supply chain by piloting regenerative agriculture projects. The starting point for these projects was securing input materials and enhancing performance; however, it became clear that they could also help Givaudan to deliver on its purpose as well as its environmental and responsible sourcing commitments. An example is the GUARABEST program which is designed for more than 240 Brazilian guarana farmers from 2 cooperatives. This program uses extension services on best possible agricultural practices to improve the botanical performance of guarana, establish traceability to source, reduce negative environmental impacts and improve farmers' economic resilience.

Additional sources of value:

- Positive environmental impacts (see metrics below)
- Increase in farmers' incomes and economic resilience and provides greater market opportunities

Tools:

- Traceability to production unit level
- Extension services to farmers
- Regenerative guarana experimentation and demonstration farm

Project metrics:

- Soil health and water
- Carbon mitigation and sequestration
- Biodiversity
- Return on investment for Givaudan and partner farmers

Project evaluation:

- Value for the business from:
- Avoided cost related to disruption of supply
 - Improved product placement as premium guarana extract

Project partners:

Local guarana producers, cooperatives, local implementation partner, design partner (ReNature)

Duration:

2019-[On-going]

NbS Blueprint case studies
 → *Givaudan: Mitigated supply chain risk and improved business and environmental performance in Brazil*

Context and additional information

GUARABEST Programme

A specific Guarana Farming “Handbook” was issued to support the implementation of best practices, accompanied by training sessions and coaching. Key examples of agricultural best practices include:

- Better adapting fertilization methods to the crop needs and fostering the use of organic manure
- Implementing good pruning practices to improve guarana trees fruit setting and consequently seed yield
- Investigating guarana genetic diversity for plant material improvement
- Set up of an experimental and demonstration regenerative guarana farm combining intercropping of guarana trees with fruit and service trees, use of cover crops, integrated soil fertility management, pruning plan, etc.

Givaudan approach to NbS

- The GUARABEST program shows that **Nature-based Solutions** can help **meet core business imperatives** such as building resilient supply chains, continuous improvement of business performance, and contributing to Givaudan’s corporate sustainability goals.

- As such, Givaudan is **expanding this model** by leveraging **other agronomic projects** across different regions and supply chains to test and promote Regenerative Agriculture farming models. All of them are **commercially driven** and have the ability to support the company’s purpose, ambitions and sustainability goals.
- The implementation of these projects is mainly driven by Givaudan’s Agronomy team with support from external partners.
- The insights and experiences gathered through these projects should enable Givaudan to scale up the promotion of regenerative farming practices in its key Naturals supply chains, and therefore contribute to the company’s Scope 3 roadmap.

Partnerships

- Globally, Givaudan has developed a broad network of implementation, technical and academic partners
- reNature was the partner for the design of the Regenerative guarana project

Challenges / lessons learned

- High volatility of ingredient price and competition at farm gate were both notable challenges
- Little available background experience on a “regenerative guarana model”. Based on the initial

socio-economic and agronomic diagnosis, a model farm and associated crop management programme was developed and is being tested for a minimum period of 3 years to assess the performance of the design (agronomically, environmentally and economically).

- Based on the trial results, the model can be promoted at scale to other guarana producers in the supply chains provided that the enabling conditions are also met (capital expenditure, technical support, etc.)
- It remains a challenge to assess the contribution of the model in terms of carbon removals in the scope 3 accounting calculations.



Godrej Group: *Integrated Watershed Development Project in Nashik, India*



Value drivers

- Risk management & mitigation
- Strategic priorities & ESG

NbS types

- Watershed/wetland restoration
- Regenerative agriculture

Challenge

- Drought conditions, poor water quality, high water use, heavy use of fertilizers and chemicals that flow into the catchment area, and weak governance

Opportunity

- Using a multistakeholder approach, Godrej worked in drainage basins and catchment areas to help restore the ecological balance of the region by harnessing, conserving and regenerating degraded natural resources such as soil, vegetative cover and water

Corporate strategy connections with NbS

- To manage the identified risk of water stress, Godrej Industries has committed to water positivity
- The "Integrated Watershed Development Program" was established and rolled out in 2016 across locations in India in order to meet the water positive target

Context

The aim of the *Integrated Watershed Development Program* is to help restore the ecological balance of target regions by harnessing, conserving and regenerating degraded natural resources such as soil, vegetative cover and water while reducing the company's risk of water stress. The program comprises of multiple projects covering a total of ~4,850ha situated in drought-prone regions in India. One example project is the catchment area of Dindori in Nashik where a Godrej Plant is located. It is a large basin of water connected to agricultural production as well as water for drinking, domestic needs, marketing and local livelihoods. The delineated catchment in the vicinity of the Godrej Agrovet plant at Ashewadi village consists of 9 villages with an overall area of 6,688ha. Water scarcity in the summer months, harmful farming practices and high demand and use have negatively impacted the water quality and availability in the area. With the support of implementation partners, Godrej is restoring and improving water quality, availability and groundwater resources by maintaining existing dams and irrigation structures, improving soil health, inserting artificial groundwater recharges, and educating the local population on the importance of water.

Additional sources of value:

- Improved water quality, availability
- Better educated population
- Improved agricultural practices and chemical use
- Improved agricultural yield

Activities that are undertaken in this program:

- Capacity building and awareness program
- Implementation of Sustainable Agriculture & Land Management (SALM) practices with nearby farmers
- Community development initiatives

Project evaluation / project metrics:

- Watershed area developed
- Reduced GHG emissions
- Water captured
- Farmers impacted

Project partners:

National Bank for Agriculture & Rural Development (NABARD), Watershed Organisation Trust (WOTR), Aga Khan Rural Support Programme (AKRSP), Peoples Action for Creative Education (PEACE)

Duration:

2016-2024

NbS Blueprint case studies
 → Godrej Group: Integrated Watershed Development Project in Nashik, India

Context and additional information

Integrated Watershed Development Program

- The program comprises of multiple projects covering a total of ~4,850ha throughout drought-prone regions in India.
- The Integrated Watershed Development Program is a large-scale, agriculture-based, water percolation project that involves the restructuring of a valley to arrest or slow down water after rainfall, allowing it to percolate into the soil. This helps to increase the water table and improve water availability.
- In regions dependent on agriculture, a higher water table helps ensure year-round cropping. In FY22-23, Godrej captured 32 million kiloliters of water which was made available for agriculture.
- The program also allowed for the formation of the Village Watershed Community, which provides educational and financial support to village members involved.

NbS at Godrej

- At the Godrej Group, biodiversity and water management began as part of the family owners' philanthropy efforts and is now embedded in the group's goals and strategy.

- Once water stress was identified through the corporate risk process, improved management practices were initiated at operating sites. The knowledge and skills gathered through the Integrated Watershed Development Program were used to establish projects that allow Godrej to pivot towards becoming water positive and mitigating future risks.

Lessons learned

- The social impact of the project enhanced community camaraderie and ownership through the formation of village watershed committees. These also offer a platform for financial access and an avenue for women to speak and be heard (~30% of women participate). The interventions also promoted income and employment diversification.
- For the successful implementation of sustainability projects, it is critical to set clear goals, realistic deadlines and have support from the board/executive leadership and senior business leaders. As a result, Godrej Group now:
 - prepares an annual operating plan which weaves sustainability targets into key responsibility areas for dedicated Green Champions;
 - enforces a robust governance mechanism that provides the ability to monitor, review and enhance sustainability performance;

- has established an innovation cell specifically dedicated to exploring state-of-the-art sustainability solutions that can shape medium to long-term strategies;
- holds itself accountable and continuously improves by participating in multiple ESG disclosures and measuring its performance against industry peers.



GSK:

Contributing to a nature positive world through watershed replenishment in Nashik, India



Value drivers

- Risk management & mitigation
- Strategic priorities & ESG

NbS types

- Wetland restoration
- Regenerative agriculture

Corporate strategy connections with NbS

- GSK is publicly committed to a net zero, nature positive, healthier planet with ambitious goals set for 2030 and 2045 and believes that action on nature matters for health, climate and business success.
- GSK has a clear pathway to reduce carbon emissions by at least 90% by 2045 and to contribute to a nature positive world in line with the goal of the post-2020 Global Biodiversity Framework: to halt and reverse biodiversity loss by 2030.
- To support its commitment to reducing its impact on climate and nature, GSK invests in high quality nature protection and restoration, including investing in nature-based solutions.

Challenge

- Reducing water risk and improving local communities' health and livelihoods

Opportunity

- Go above and beyond initial objectives, create a long-lasting positive impact in the wider basin

Context

Human health relies on the fundamentals of nature: clean air and fresh water. Nature loss has a range of negative impacts on health. For example, habitat degradation and deforestation are increasing the risk of new human pathogens and pandemics and nutrition is impacted by changes to agriculture. Protecting nature makes businesses more resilient and can inspire future innovations. Water is also essential for the production of GSK vaccines and medicines. GSK is committed to reducing the amount of water used for manufacturing, keeping any Active Pharmaceutical Ingredient (API) emissions from manufacturing below the predicted no-effect level for all sites and working with local communities to further take action to improve livelihoods and sanitation in water-stressed basins. In India, GSK has partnered with WOTR, a non-profit

organization that works to tackle the key causes of rural poverty by rejuvenating ecosystems and building the community's resilience to climate change. The project will be implemented in four villages in the Nashik district and aims to tackle the problem on two main fronts: (1) improve the water storage potential of the four identified villages through ecosystem-based adaptation solutions and (2) build the response capacity of the communities to stabilize and enhance agricultural productivity through soil and water conservation. This project also involves educating and empowering communities to implement sustainable agriculture and improve degraded landscapes. These activities aim to improve water availability in the dry season and slow the flow of excess water during monsoon season for sustainable agriculture use, domestic purposes and ecosystems regeneration.

NbS Blueprint case studies
 → *GSK: Contributing to a nature positive world through watershed replenishment in Nashik, India*

Additional sources of value:

- Increased economic stability, health and education to local families through improved agriculture yield of local subsistence farmers
- Increased biodiversity through eco-friendly agricultural practices
- Increased resilience to climate change

Tools:

- Engagement with local communities on sustainable agriculture practices and conservative water use
- WOTR's water budgeting tool and micro-irrigation techniques
- Technological improvement of water infrastructure (WRI Volumetric Water Benefits Accounting Methodology)

Project evaluation metrics and targets:

- Target population: >2,000 ha and >4,000 people
- Water replenishment: increase water capacity (m³) through water storage and soil/water conservation
- Sustainable agriculture: improve crop productivity (%) and improve livelihoods (\$)
- Health: drinking water sources and nutrition (via crop productivity)

Overcoming challenges:

- Identification of a water replenishment program with human and health co-benefits incorporated
- GSK's first NbS pilot intervention – opportunity to learn how it can scale intervention in other basins

Project partner:

Watershed Organisational Trust (WOTR)

Duration:

Project began Q4 2023 for 3 years [on-going]

Context and additional information

Environmental sustainability strategy and approach at GSK

GSK's environmental sustainability strategy focuses on the interconnectedness of climate, nature and human health. GSK is publicly committed to a net zero, nature positive, healthier planet, with ambitious climate and nature goals set for 2030 and 2045. In November 2020, it set ambitious twin goals on climate and nature and it is taking action to achieve those goals.

GSK has a clear pathway to a net zero impact on climate and aims to reduce carbon emissions across the full value chain by at least 90% by 2045. Its plan to contribute to a nature positive world is in line with the goal of the post-2020 Global Biodiversity Framework to halt and reverse biodiversity loss by 2030. GSK's approach is through four focus areas which are aligned to the 'realms' of nature as defined by TNFD and SBTN. These are the major components of the natural world – freshwater, land, oceans and atmosphere – including the biodiversity of living species across these realms.

GSK is taking action by:

1. avoiding and reducing impacts on nature across the full value chain,
2. investing in the protection and restoration of nature and
3. helping to drive collective action for nature.

GSK has deepened its understanding of its full value chain nature impacts and dependencies and continues to align with evolving practices and guidance. For example, in 2022 GSK followed the TNFD LEAP (Locate, Evaluate, Assess and Prepare) methodology to better understand its nature-related risks and opportunities.

It is also part of the first group of companies working with the Science Based Target Network (SBTN) to set validated science-based targets for nature starting with targets for freshwater and land, followed by targets for oceans and biodiversity. These targets will focus on locations across GSK's value chain where nature is particularly under pressure. GSK expects to set its first science-based targets for nature in 2024.

GSK approach to NbS

- Investing in nature protection and restoration within and outside its value chain is a key part of GSK's ambition and commitment to achieve a net zero, nature positive, healthier planet.
- While continuing to reduce its impact, to support its net zero impact on climate goal, GSK is investing in high quality nature protection and restoration, including Nature-based Solutions equivalent to 20% of its 2020 carbon footprint.
- GSK recognizes that carbon credits and Nature-based Solutions are a key part of the solution but are complicated and difficult to get right. That's why it really matters that projects and credits are genuine and high-quality.

INGKA: *Wild gardens for local biodiversity at IKEA Timisoara*



Value drivers

- Business performance
- Strategic priorities & ESG

NbS type

- Creation of urban green spaces

Corporate strategy connections with NbS

- INGKA Group's main priority areas are circularity, reducing climate impact and supporting vulnerable communities
- INGKA is currently working on developing its sustainability strategy including and amplifying nature and biodiversity
- All IKEA buildings (including those under INGKA's management) follow the BREEAM sustainable building certification requirements but INGKA aims for further positive impact

Challenges

- High water and maintenance cost of existing green gardens
- Low biodiversity and insect population

Opportunity

- Reduce water and maintenance cost while improving biodiversity and employee health

Context

IKEA's policy requires all shops (including those managed by INGKA) to landscape with grass and trees. To increase biodiversity and reduce water and maintenance costs, IKEA Timisoara implemented a project pilot partnering with InsectRespect to transform one of the existing gardens into a wild local vegetation biodiversity hotspot. The primary goal and business case was to reduce maintenance cost and water use, especially in a climate change scenario where extreme weather events significantly increase. The garden included local insect-friendly shrubs and bushes in the outer margin, structure elements for habitat, hibernation, and shelter and local flowering insect-friendly herbs and flowers. The pilot project was extremely successful in reducing water use and maintenance costs but additional positive impacts on employee and customer wellbeing were also apparent. In general terms a biodiversity garden offers diverse habitats for a broad range of insects, small mammals, reptiles, and amphibians, as well as food sources and a wider variety of flowering plants (compared to traditional landscaped gardens). Furthermore, a biodiversity garden requires less maintenance as flowering areas are cut only once a year, which leads to cost savings.

Additional sources of value:

- Increased happiness and mental health of employees
- Customers were also happy to see more diverse biodiversity
- Reduced maintenance costs

Project evaluation / project metrics:

- Number of flowering species
- Period of flowering
- Number of insect species
- Diversity in habitat and shelter

Project partner:

InsectRespect

Duration:

2023 - ongoing

NbS Blueprint case studies
→ *INGKA: Wild gardens for local biodiversity at IKEA Timisoara*

Context and additional information

INGKA Group

INGKA Group consists of three business areas:

- The core business is IKEA Retail which consists of 379 IKEA stores including city stores across 31 markets and counting.
- INGKA Centres creates meeting places where each center is anchored by an IKEA store. So far, Ingka has established 44 experience-oriented shopping centers across Europe and China – and more are on the way.
- INGKA Investments allows IKEA to expand the retail business by partnering with companies that share similar values.

Sustainability strategy at IKEA

IKEA's three major focus areas are:

- Healthy & sustainable living
- Circular & climate positive
- Fair & equal

Nature commitments are being developed as IKEA is working towards setting SBTi targets and looking at SBTN for guidance.

INGKA & IKEA approach to NbS

- An initial materiality assessment identified hotspot locations; Nature-based Solutions are being identified to mitigate risks and reduce impact.
- The pilot project in Timisoara was a great success with both customers and employees and generated a stronger push to implement similar solutions across multiple IKEA facilities.



Reckitt:

Sustainable cultivation of rubber farms in Thailand



Value drivers

- Risk management & mitigation
- Business performance
- Strategic priorities & ESG

NbS type

- Sustainable agriculture and farming practices

Corporate strategy connections with NbS

- Biodiversity strategy aimed at protecting and restoring nature by assessing top-priority materials, identifying risks and opportunities
- Ensuring access to key input materials for products (resilience to safeguard business continuity)

Challenge

- Reduce supply chain risk (upstream; materials/ingredients)

Opportunity

- Add to a framework for strategic supply development including NbS, mitigating nature-related risks in the supply of key raw materials

Context

Reckitt is collaborating with external partners to develop a “good” practice approach to assess, manage and report on environmental factors with the aim to identify impactful NbS investments. Reckitt worked with Nature based Insights (Nbi – a spinoff of Oxford University), smallholder farming communities and local NGOs (including Earthworm Foundation) to build an analytical framework for the rubber farming landscape in southern Thailand. The framework is designed to estimate the impacts of Reckitt’s operations on biodiversity and livelihoods in this region which forms part of Reckitt’s supply network and is related to a material input (latex). Impact estimation is supported by the Nbi Analytics model which relies on the best available models and datasets to estimate a Biodiversity Impact Metric (BIM) and is then used to establish biodiversity baselines. Once a baseline is set, the Analytics model simulates scenarios to project and address impacts through Nature-based Solutions activities, identifying ecologically-sound investment strategies which will have a positive impact for both farmer communities and biodiversity. By providing a comprehensive and multidimensional perspective, this approach informs strategies for mitigating and adapting to nature-related risks.

Additional sources of value:

- Measurable biodiversity impacts from latex farming and from implementing NbS on and off-farm in the latex production landscape
- Improving Reckitt’s TNFD disclosure

Tools:

- Bespoke Analytical Framework supported by the Nbi Analytics model; designed to estimate Reckitt’s impacts, risks and opportunities associated with biodiversity, and monitor and evaluate the biodiversity impacts of NbS as they are implemented
- Biodiversity Impact Metric (BIM): estimates biodiversity impacts as a function of land use, land cover, the proportion of biodiversity lost and the importance of local biodiversity

Project evaluation / project metrics:

- Improved BIM (in km²)
- Farm/landscape footprint
- Farming activity, soil/aquatic eutrophication, carbon emissions

Project partners:

Nature-based Insights; Earthworm Foundation, Sustainable Rubber Association of Surat Thani

Duration:

3 years with ongoing interventions and measurement

Context and additional information

Reckitt's approach to biodiversity

Reckitt's purpose is "to protect, heal and nurture in the relentless pursuit of a cleaner, healthier world". It is working on a biodiversity strategy that supports a nature-positive future. To do so, it partnered with Nature-based Insights (Nbi) to measure the impact of its priority natural raw materials such as latex. The resulting framework and results will guide Reckitt's actions to reduce greenhouse gas emissions, address biodiversity priorities and enhance people's livelihoods. Reckitt has also applied the TNFD recommendations, which provided insights on material nature-related risks and will help to inform the biodiversity strategy.

Challenges and lessons learned

Framework development

Key challenges:

- **Localized data:** need to develop local data at a quantitative level to assess impacts and interventions from a broader initial qualitative evaluation.
- **Time scale and scope for updating and monitoring data:** annual assessments do not always support an effective change in nature as biodiversity takes longer to be measured. Data analysis cycles also need to align with program implementation schedules for findings to be implemented efficiently.
- **Social aspect** is a **crucial** part of implementation and needs to be part of evaluation as well. Therefore, working with local supply chain to improve data granularity is key.

Lessons learned:

- Pragmatic approach is needed due to scale of landscape and with limited specific localized data at the outset (in this case from ~800 smallholder farmers). Impact assessment is also still evolving and will have various options as more approaches are defined at landscape level (in support of disclosure at company level) such as:
 - **Measuring direct impact on project or near-project activities** with robust metrics that can be applied to consider impact and to other interventions/projects
 - **Measuring/assessing indirect impact to the landscape or company** to provide context and support for principles of land use, interventions developed and impact to the company
- Robust methodology and similar metrics are needed to establish a representative sample size and establish confidence for NbS project implementation (and investment).
- TNFD will be the framework referenced in the future by Reckitt with disclosures and further development of the methodology. This reflects the company's existing approach on climate-related disclosures (TCFD).

The business value of NbS

- Clear understanding among senior management that dependence on natural resources can pose a risk to operations.
- Evidence for senior management where NbS reduce supply and quality risks (e.g. latex quality, yield).

- Buy-in from management regarding nature-related risks including development of the assessment framework and NbS investment.
- Assessing the current and avoided nature-related and supply chain risks within a framework that allows performance management of interventions to strengthen biodiversity and offer potential climate solutions.
- Building stronger quantification of risks in an emerging area.



Appendix

Appendix

Appendix A: Example nature metrics and monitoring tools

Tool and framework	Description
Case Study company tools	
Ecosystem Intelligence Tool (previously Ecosystem Services Identification & Inventory, or ESII)	→ Licence-based, developed by Ecosystem Intelligence in partnership with Dow and The Nature Conservancy → Designed as a comprehensive quantification platform for Nature-based Solutions to help the user identify and measure benefits → Outputs are available using various metrics (percent performance, functional, area, etc.) that provide different ways of understanding ecosystem services or benefits → Processes company field data with robust ecological models to analyze how nature is performing on-site → Includes a data collection tool for use in Ecosystem Services Assessments and during field work, the EI Tool App
Biodiversity Impact Metric (BIM) tool	→ Bespoke methodology developed by Reckitt in partnership with Nature-based Insights (a spin-out of Oxford University) → Used by Reckitt to measure impact on biodiversity and ecosystems, informing sustainable sourcing → Provides an analytical framework for assessing biodiversity, carbon and social impacts in five key supply chains, which include latex and palm oil → The framework includes robust, science-based metrics for biodiversity, resulting in a Biodiversity Impact Metric score (BIM) to quantify these impacts (based on the Biodiversity Intactness Index)
Other company tools	
Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST)	→ Open-source software including a suite of models used to map and value the goods and services from nature that sustain and fulfil human life. → These models project how changes in ecosystems can lead to changes in the flows of many different benefits to people → Uses maps as information sources and produces maps as outputs.
Kering Environmental Profit & Loss (EPL)	→ Publicly available methodology developed by Kering; was not directly developed to design or measure NbS but can help with translating impact into monetary values to make the business case → EPL measures carbon emissions, water consumption, air and water pollution, land use and waste production along the entire supply chain, thereby making associated environmental impacts visible, quantifiable, and comparable → These impacts are then converted into monetary values to quantify the use of natural resources
The Capitals Approach	→ Frameworks supporting companies in identifying, measuring and valuing impacts and dependencies on natural, social, and human capital, translating some aspects of NbS activities into useful metrics for assessment and decision-making → Includes guidance on integrating decision-making across multiple forms of capital and initial suggestions on addressing trade-offs

Appendix B: NbS benefit evaluation methods

Benefit Accounting of Nature-Based Solutions for Watersheds Guide (Version 2) includes methods for evaluating/quantifying a wide range of NbS benefits. The following benefits are covered:

- Water Quantity
 - Reduced/avoided surface runoff and associated erosion
 - Improved/maintained surface water storage
 - Increased/maintained groundwater recharge and storage
 - Improved/maintained flow regime
 - Improved/maintained flood protection and mitigation (inland and coastal)
- Water Quality
 - Improved/maintained surface water quality
 - Improved/maintained groundwater quality
- Carbon
 - Improved/maintained carbon sequestration
 - Reduced carbon emissions
- Biodiversity and Environment
 - Improved/maintained terrestrial habitat availability and quality (including soil health)
 - Improved/maintained aquatic habitat availability and quality

- Improved/maintained terrestrial habitat connectivity
- Improved/maintained aquatic habitat connectivity
- Improved/maintained support for local pollinators
- Improved/maintained natural pest control
- Increased/maintained abundance and diversity of native plant species
- Increased/maintained abundance and diversity of native animal species
- Socio-Economics
 - Improved/maintained climate adaptation and mitigation
 - Improved/maintained livelihood opportunities
 - Improved/maintained human health
 - Improved/maintained agriculture/agricultural output
 - Expanded/maintained religious/spiritual settings
 - Enhanced/maintained microclimate regulation
 - Improved/maintained opportunities for education/scientific study
 - Increased/maintained food security
 - Improved/maintained recreation/tourism opportunities
 - Increased/maintained property/land value

Below are five tables (A1-A5), taken from Benefit Accounting of Nature-Based Solutions for Watersheds Guide (Version 2), that list metrics and calculation methods for evaluating the benefits listed above.



Table A1: Water quantity benefits and associated activities, indicators and calculation methods

Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Reduced/Avoided Surface Runoff and Associated Erosion	Terrestrial protection	Avoided habitat conversion	Avoided runoff	Curve number method
	Terrestrial restoration and management	Plant/restore native vegetation	Reduced runoff	Curve number method
Improved/Maintained Flood Protection and Mitigation (Inland and Coastal)	Agricultural management	Agricultural NBS (e.g. plant vegetation buffers including cover crops)	Reduced runoff	Curve number method
Improved/Maintained Surface Water Storage	Wetland creation (artificial or introduced)	Construct treatment systems (treatment wetlands, rain garden treatment systems)	Volume treated	Volume treated method
	Urban habitat creation, wetland creation	Store rainwater (retention/ detention ponds, rain gardens, etc.)	Volume captured	Runoff reduction method
	Terrestrial and wetland restoration	Remove invasive and aggressive indigenous species	Reduced evapotranspiration*	Evapotranspiration method
Improved/Maintained Flood Protection and Mitigation (Inland and Coastal)	Aquatic restoration and management	Re-establish hydrologic connection (floodplain inundation, rewetting of historical wetland)	Increased inundation volume	Inundation method
Increased/Maintained Groundwater Recharge and Storage	Wetland protection	Avoided habitat conversion (wetland)	Maintained recharge	Recharge method
	Urban habitat creation, agricultural creation	Store rainwater and recharge aquifers	Increased recharge	Capture and infiltration method or recharge method
Improved/ Maintained Flow Regime	Aquatic restoration	Reduced/avoided resource abstraction	Reduced withdrawal or consumption	Withdrawal or consumption method
	Aquatic restoration	Remove hard structures (instream barrier removal)	Improved flow regime	Hydrograph method
	Terrestrial and aquatic restoration	Remove invasive and aggressive indigenous species	Reduced evapotranspiration*	Evapotranspiration method

Source: Volumetric Water Benefit Accounting (VWBA): A Method for Implementing and Valuing Water Stewardship Activities (Reig et al., 2019)

**Where site-specific modeling or monitoring data are available to support the analysis, volumetric benefit associated with invasive species removal may be quantified based on improved flow regime.*

Table A2: Activities that contribute to improved water quality and corresponding indicators and calculation methods

Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Improved/Maintained Surface Water Quality	Terrestrial protection	Avoided habitat conversion	Avoided pollutant load	Modified simple method; Revised Universal Soil Loss Equation (RUSLE)
	Terrestrial restoration and management	Plant/restore native vegetation	Reduced pollutant load	Modified simple method; RUSLE
		Remove hard surfaces	Reduced pollutant load	Modified simple method; RUSLE
	Aquatic restoration and management	Restore/improve/stabilize substrates (streambank stabilization)	Reduced pollutant load	Stream bank recession rate
	Aquatic restoration management	Agricultural NBS (e.g. restore/improve soil health, grazing management systems, terraced/contour planting, mulching and fertilizing)	Reduced pollutant load	RUSLE or agricultural best management practice models under development (e.g. Nutrient Tracking Tool)
		Agricultural NBS (e.g. plant vegetation buffers)	Reduced pollutant load	Pollutant reduction efficiency method
	Wetland creation	Construct treatment systems (constructed wetland treatment systems, stormwater capture/ treatment systems with well-defined inlets and outlets (e.g. bioswales))	Reduced pollutant load	Direct monitoring
		Construct treatment systems (stormwater capture/ treatment systems without well-defined inlets and outlets: rain gardens, conservation landscaping, bioretention, green roofs)	Reduced pollutant load	Modified simple method

Table A3: Carbon benefits and associated activities, indicators and calculation methods

Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Improved/Maintained Carbon Sequestration	Terrestrial restoration, wetland and mangrove restoration	Plant/restore native vegetation, introduce grazing management systems	CO2 removals by above- and below-ground biomass and soil	Stock-change or gain-loss methods
	Agricultural management	Agricultural NBS (introduce grazing management systems, plant vegetation buffers)	CO2 removals by above- and below-ground biomass and soil	Stock-change or gain-loss methods
Reduced Carbon Emissions	Terrestrial (forest, grassland) protection	Avoided habitat conversion (forest, grassland)	Avoided CO2 emissions (metric tons) from above- and belowground biomass and soil	Stock-change or gain-loss methods Land cover and climate altering land cover indicator
	Agricultural management	Agricultural NBS (activities relating to rice management like restoring/improving soil health)	Avoided CH4 emissions from soil (rice fields)	Stock-change or gain-loss methods
	Wetland protection	Avoided habitat conversion	Avoided CH4 emissions from soil at wetlands	Stock-change or gain-loss methods Land cover and climate altering land cover indicator

Table A4: Biodiversity benefits, indicators and calculation methods

Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Improved/Maintained Terrestrial Habitat Availability and Quality	Terrestrial management, protection	Avoided habitat conversion	→ Total protected habitat → Protected habitat in high priority or highly threatened areas	Measured or estimated hectares of land protected
	Terrestrial restoration, management, protection	→ Plant/restore/maintain native vegetation; → Restore/improve/stabilize substrates	→ Total restored habitat → Available habitat for species	Measured or estimated hectares of land restored
	Terrestrial restoration, management, protection, creation	→ Remove hard surfaces → Remove hard structures/barriers → Restore/improve soil health → Restore/improve/stabilize substrates → Plant/restore/maintain native vegetation → Manage/repopulate native fauna → Remove invasive (or aggressive indigenous) species → Undertake brush control → Undertake fire management → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Extent/coverage and condition of habitats	→ Species habitat index → Biodiversity habitat index → Biodiversity intactness index → Proportion of land degraded over total land area → Global ecosystem restoration index (GERI) → Coverage of protected areas
	Terrestrial management	→ Remove hard surfaces → Remove hard structures/barriers → Restore/improve soil health → Restore/improve/stabilize substrates → Plant/restore/maintain native vegetation → Manage/repopulate native fauna → Remove invasive (or aggressive indigenous) species → Undertake brush control → Undertake fire management → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Area of habitats under sustainable management	→ Species habitat index → Biodiversity habitat index → The species threat abatement restoration metric (STAR) → GERI → Coverage of protected areas

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→ *Appendix B: NbS benefit evaluation methods*

Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Improved/Maintained Terrestrial Habitat Connectivity	Terrestrial restoration, management, protection	→ Remove hard structures/barriers → Restore/improve/stabilize substrates → Plant/restore/maintain native vegetation → Remove invasive (or aggressive indigenous) species → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Habitat connectivity/fragmentation	→ Species habitat index (a proxy for habitat connectivity) → Biodiversity habitat index → Proportion of land degraded over total land area → GERI → Coverage of protected areas
Improved/ Maintained Aquatic Habitat Availability and Quality	Aquatic protection	Avoided habitat conversion	→ Total protected area, shoreline or river length → Protected area or length in high priority or highly threatened areas	→ Measured or estimated protected area or river length
		Restore/improve/stabilize substrates	→ Total restored area, shoreline or river length → Restored area or length in high priority or highly threatened areas	→ Measured or estimated restored area or river length → Proportion of land degraded over total land area
		Plant/restore/maintain native vegetation	→ Total restored area, shoreline or river length → Restored area or length in high priority or highly threatened areas	→ Measured or estimated restored area or river length
	Aquatic restoration, management, protection	→ Remove hard surfaces → Remove hard structures/barriers → Restore/improve soil health → Restore/improve/stabilize substrates → Dredge substrate → Plant/restore/maintain native vegetation → Manage/repopulate native fauna → Remove invasive (or aggressive indigenous) species → Undertake brush control → Undertake fire management → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Extent/coverage and condition of habitats	→ Species habitat index → Biodiversity habitat index → Biodiversity intactness index → Proportion of land degraded over total land area → Coverage of protected areas

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Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Improved/ Maintained Aquatic Habitat Availability and Quality <i>(continued)</i>	Aquatic management	→ Remove hard surfaces → Remove hard structures/barriers → Restore/improve soil health → Restore/improve/stabilize substrates → Dredge substrate → Plant/restore/maintain native vegetation → Manage/repopulate native fauna → Remove invasive (or aggressive indigenous) species → Undertake brush control → Undertake fire management → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Area of habitats under sustainable management	→ Species habitat index → Biodiversity habitat index Area of habitats under sustainable management → STAR → GERI → Coverage of protected areas
Improved/ Maintained Aquatic Habitat Connectivity	Aquatic restoration, management, protection	→ Remove hard structures/barriers → Restore/improve/stabilize substrates → Dredge substrate → Plant/restore/maintain native vegetation → Remove invasive (or aggressive indigenous) species → Avoid/limit habitat conversion → Reduce/avoid resource abstraction	Habitat connectivity/ fragmentation	→ Species habitat index (proxy for habitat connectivity) → Biodiversity habitat index → Proportion of land degraded over total land area → GERI → Coverage of protected areas
Improved/ Maintained Support For Local Pollinators	Agricultural management	→ Plant/restore/maintain native vegetation → Plant vegetation buffers → Undertake brush control	Number of plant species	Estimated count and/or number of species based on field counts before and after project
		→ Plant/restore/maintain native vegetation → Plant vegetation buffers → Undertake brush control	Number of pollinators	Estimated or modelled number of pollinators

Building a business case for NbS
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Benefit	Habitat Intervention	Activity	Indicator	Calculation Method
Increased/ Maintained Abundance and Diversity of Native Plant and Animal Species	Terrestrial and aquatic management, restoration and protection	Plant/restore/maintain native vegetation	Variety and number of native species	Estimated count and/or number of species based on field counts before and after project
		Manage/repopulate native fauna	Abundance and distribution of selected species	→ Wildlife picture index → Species habitat index (proxy for abundance) → Biodiversity habitat index (proxy for abundance) → Biodiversity intactness index → Shannon and Simpson's diversity indices
			→ Change in status of threatened and/or protected species → Change in status of priority or indicator species	→ Wildlife picture index → Species habitat index → Biodiversity intactness index → Shannon and Simpson's diversity indices → Red List index → STAR
	Agricultural restoration, management, protection	→ Plant/restore/maintain native vegetation → Manage/repopulate native fauna	Genetic diversity in native breeds of farm animals and cultivated varieties of agricultural and horticultural crops	→ Biodiversity intactness index → Shannon and Simpson's diversity indices → Red List index

Table A5: Benefits and indicators for socio-economic benefits

Benefit	Indicator	Calculation Method
Improved/Maintained Climate Adaptation and Mitigation	Reduction in number or percentage of climaterelated hazards/disaster risk reduction (heatwaves, flooding, drought)	→ Reduction in Climate-Related Hazards → Compare records of climate-related hazards from pre- and post-project implementation → Risk Reduction → United Nations Office for Disaster Risk Reduction - National Disaster Risk Assessment → United Nations Office for Disaster Risk Reduction - Disaster Resilience Scorecard for Cities → World Bank Urban Risk Assessment
	Reduction in number or percentage of infrastructure/ property damage after extreme events	→ Compare records of infrastructure/property damage from extreme events from pre- and post-project implementation → Use formal surveying processes to gauge levels of damage, such as FEMA Preliminary Damage Assessment
	Reduction in health impacts from climate-related conditions/ diseases	(See health benefits)
	Reduced loss of lives due to extreme weather events	Compare records of loss of life from extreme weather events from pre- and post-project implementation
	Reduced impacts on water quality and quantity	(See water benefits)
	Avoided greenhouse gas emissions	(See avoided carbon emissions)
	Reduced impacts of climate change on agricultural outputs	(See food security)
	Reduce urban heat island effects	(See microclimate regulation)
Improved/Maintained Livelihood Opportunities	Change in poverty rate	The Poverty Probability Index , typically used by organizations and companies, is a series of 10 questions regarding a household's characteristics and asset ownership, which are scored to compute the likelihood that the household is living below the poverty line. Through repeated use of this index, the project team can have a clearer picture of how an NBS project has impacted poverty rates.
	Total job availability by job type	US Bureau of Labor Statistics
	Job retention	Employee retention rates can be determined by dividing the number of employees who stayed during a given time by the number of employees that were at the start of the period; multiply this result by 100. The company Built In also provides an Employee Retention Rate Calculator (Heinz & Urwin, 2022).

Building a business case for NbS
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Benefit	Indicator	Calculation Method
Improved/Maintained Livelihood Opportunities (<i>continued</i>)	Shadow wage benefits	Estimating Shadow Wage Rates for Economic Project Appraisal
	Reduce time burdens	→ Reduced time spent collecting water, food, fuel and fiber in households and in unpaid care, particularly for women and girls → To calculate reduced time burdens, residents can be surveyed on how much time they spent doing certain activities (collecting water/food/fuel/fiber, unpaid care, etc.) before the NBS project was developed and for subsequent years after the project is completed
Improved/Maintained Human Health	Physical health metrics (e.g. blood pressure)	Physical health metrics can be assessed via questionnaires, such as: → PROMIS measures → RAND's Medical Outcomes Study 36-Item Short Form Health Survey → CDC's HRQOL–14 Healthy Days Measure → The YOUTHREX International Physical Activity Questionnaire specifically to track changes in physical activity for a population
	Perceived public safety	→ Analyze changes to public crime rate data → Survey the public regarding their perceived sense of safety, via questionnaires such as the University of Sydney's Perceptions of Crime and Safety survey
	Mental and emotional health metrics (e.g. improvement in mood, workplace satisfaction, quality of life)	Mental health metrics can be assessed via questionnaires, such as: → Oxford Brookes University's Oxford Happiness Questionnaire → World Health Organization's Well-being Index (WHO-5) → Warwick Medical School's Warwick-Edinburgh Mental Wellbeing Scale → Ohio State University's Perceived Stress Scale
Improved/Maintained Agriculture/ Agricultural Output	Increased crop yields and quality	Crop yield is typically expressed as kilograms of harvested crop per hectare of harvested area. There are a several ways to calculate or estimate crop yield, including whole plot harvest, the crop cut method, sampling of harvest units, farmer recall, farmer prediction, and crop modeling. Measuring crop yields can be complex, depending on the spatial scale that is being measured and whether multiple crops are planted within the same plot (FAO, 2017b).
Expanded/Maintained Religious/ Spiritual Settings	Increased spiritual well-being	Spiritual well-being can be recorded via surveys and questionnaires. The types of questions that are asked should be reflective of the types of spiritual, religious and cultural traditions that exist within the population being surveyed.
Enhanced/Maintained Microclimate Regulation	Change in peak air temperatures	To confirm changes to the microclimate of an NBS project, the project team will want to routinely measure and record air temperature and humidity. Depending on the site, other parameters, such as wind, light intensity, rainfall, and slope can also be measured.

Building a business case for NbS
→ *Appendix B: NbS benefit evaluation methods*

Benefit	Indicator	Calculation Method
Improved/Maintained Opportunities for Education/Scientific Study	Adult or child eco-literacy	→ Eco-literacy can be measured via surveys, which can contain questions that range from testing scientific knowledge about local ecosystems and general ecological concepts, through perceived beliefs and awareness regarding nature and environmental issues (Pitman and Daniels, 2016; Ha et al., 2022). → The Environmental Identity Scale (Clayton et al., 2021) is a reputable survey instrument when seeking to understand how a group of people feel connected to the environment (European Commission, 2021). → Other data to be collected may include counting the number of people that attend public environmental education programs (either in the NBS project location or within a determined spatial scale), or the number of people that engage with the NBS project site (European Commission, 2021).
	Distance to recreation	→ One way to determine the distance to recreation can be to assess the per cent of a population that lives within a designated buffer (1 mile, 10 miles, etc.) of the project boundary (Merriam, 2016). → Alternatively, the project team can identify areas of high traffic/population (urban/community centers, public transportation stations) and measure the average distance to the project site from these locations (European Commission, 2021).
	Total recreation time	Residents can either be surveyed regarding the amount of time they spend at recreation sites, or project team members can perform observational studies to calculate the average time spent at recreation sites (Cohen and Han, 2018).
	New tourism	There are several ways to calculate whether an NBS project has led to the creation of new economic and tourism opportunities. Metrics to be tracked include the number of visitors to the NBS project, counting the number of new tourism-related activities or companies in the area, calculating the annual gross profit of companies working in nature-based tourism, and counting the number of new jobs in tourism-related activities (European Commission, 2021).
Increased/Maintained Food Security	Access to and availability of food	Local access to and availability of food is best measured through household surveys administered at the local, municipal and watershed levels. There are many reputable surveys that the project team can utilize, including: → UN Food and Agriculture Organization's Food Insecurity Experience Scale, which measures food-related behaviors and experiences associated food inaccessibility due to resource constraints → World Food Program's Food Consumption Score, which looks at the diversity and frequency of food groups that have been consumed over the previous seven days
Increased/Maintained Property/Land Value	Nominal value and price	Changes in mean and median land and property prices, including rental and market prices for homes and commercial spaces, can indicate changes in property/land value of the NBS itself. High-quality green spaces typically lead to increases in surrounding property values. For agricultural habitats, land productivity, or calculating the average economic return of the agricultural activity per hectare, can be a method for calculating property/land value (European Commission, 2021).

Note: Where possible, these socio-economic benefits should be disaggregated by sex, ethnicity and population group to understand the distribution of the benefits for excluded and vulnerable groups.

Endnotes

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Disclaimer

This guidance has been developed in the name of WBCSD. Like other WBCSD publications, it is the result of collaborative efforts by representatives from member companies and external experts. A wide range of member companies reviewed drafts, thereby ensuring that the document broadly represents the perspective of WBCSD membership. Input and feedback from stakeholders was incorporated in a balanced way. This does not mean, however, that every member company or stakeholder agrees with every word.

The NbS Blueprint has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice.

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About Nature Action Imperative

WBCSD's Nature Action Imperative supports members to accelerate credible corporate action and mainstream nature in business strategies & decision-making: building the tools and guidance needed to define credible business contributions to Nature Positive (halt and reverse nature loss by 2030); preparing to engage with the emerging performance and accountability system for nature; and, catalyzing investments into nature assets. To learn more about the Imperative and related projects, visit www.wbcsd.org/Imperatives/Nature-Action.

About WBCSD

The World Business Council for Sustainable Development (WBCSD) is a global community of over 220 of the world's leading businesses, representing a combined revenue of more than USD \$8.5 trillion and 19 million employees. Together, we transform the systems we work in to limit the impact of the climate crisis, restore nature and tackle inequality.

We accelerate value chain transformation across key sectors and reshape the financial system to reward sustainable leadership and action through a lower cost of capital. Through the exchange of best practices, improving performance, accessing education, forming partnerships, and shaping the policy agenda, we drive progress in businesses and sharpen the accountability of their performance.

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The Nature-based Solutions Map



Introduction and function *of the Nature-based Solutions Map*

Welcome to version 0 of the Nature-based Solutions Map (the “Map”). The aim of the Map is to support companies in identifying where and how different NbS can address a variety of business challenges relating to:

- *core business,*
- *climate,*
- *nature,*
- *water and*
- *equity (including Social).*

The primary function of this Map is to organize available categories or groups of NbS in terms of the outcomes they can offer to businesses. The output of this Map is intended as a first step, to help users shortlist the most suitable NbS to resolve the business challenges/opportunities in question. In doing so, the Map enables the user to focus rapidly on the NbS types most likely to be relevant. The Map is not intended to present an exhaustive catalogue of individual NbS activities.

Importantly, realizing all potential benefits from any given NbS or NbS group listed in the Map will require extensive work on design and delivery, which is beyond the scope of this tool.

How to use the Map

Users should start with the actions outlined in Stage 1 of [the NbS Blueprint](#), the associated guidance on building business cases for Nature-based Solutions. This will generate a list of priority business challenges and/or opportunities, as well as the biomes/regions where each challenge/opportunity occurs. With these two pieces of information, companies can use the Map to identify the most relevant NbS.



What is included in *the Nature-based Solutions Map*

The “Map”

The Map is on pages 4 to 6. On each page, there are three key elements:

- the business challenges,
- the biomes, and
- the Nature-based Solutions.

In order to use the Map, readers **find the row** associated with the priority business challenge/opportunity in question **and the column** of the biome in which the challenge/opportunity is located. **The intersection shows the list of suitable NbS types.**

Element 1: business challenges

The first two columns list the business challenges typically faced by companies, tested and reviewed by companies operating in different sectors. The list is not exhaustive, but is considered to be reflective of the most relevant challenges across different business types and sectors; this list will be refined and developed in future iterations of the Map.

The third column provides summary descriptions of these business challenges.

Element 2: biomes

The first row lists the ecosystem groupings that are included in this version of the Map.

The second row demonstrates how the groupings broadly align with the International Union for the Conservation of Nature (IUCN) taxonomy of biomes known as the Global Ecosystem Typology (GET), referenced in the Taskforce on Nature-related Financial Disclosures (TNFD). The ecosystem groupings used in the Map have been developed to simplify the user journey for this tool. The list of ecosystems included in the Map is not exhaustive but is considered to cover the major ecosystems of relevance to businesses. This list will be refined and developed in future iterations of the Map.

Element 3: Nature-based Solutions

Each cell lists the suitable NbS types related to the row (business challenge) and column (biome). Once the user has identified suitable NbS types using the Map, they can proceed to the NbS List (page 7).

The “NbS List”

Once companies have identified suitable NbS types in the Map, they can refer to the NbS List for more detailed descriptions of the relevant NbS.

NbS activities are grouped as follows:

- freshwater and wetlands NbS,
- urban NbS,
- terrestrial NbS and
- marine and coastal NbS.

Note: This list is not considered to be exhaustive. However, it reflects the NbS that occur most frequently in guidance documents, case studies and academic literature. This list will be a 'living' resource and will be refined and developed in future iterations of the Map.

The Nature-based Solutions Map

Element 2: Biomes				Forests & woodland	Savannas, grassland & deserts	Intensive land use systems	Urban and Industrial	Rivers & lakes	Wetlands	Open ocean	Coastal
		Descriptions of business challenge/ opportunity		→ T1 (Tropical and sub-tropical forests), → T2 (Temperate and boreal forests and woodlands) → T3 (Shrublands and shrubby woodlands)	→ T4 (Savannas and grasslands) → T5 (Deserts and semi-deserts)	→ T7 (Intensive land use systems) → F3 (Artificial wetlands)	→ T7.4 (Urban and industrial ecosystems) → F3 (Artificial wetlands)	→ F1 (Rivers and streams) → F2 (Lakes)	→ TF1 (Palustrine/vegetated wetlands) → M2 (Pelagic open waters/ open ocean waters) → M3 (Deep sea floors)	→ M1 (Marine shelf) → MT1 (Shoreline systems) → MT2 (Supralittoral coastal/ Maritime vegetation) → MT3 (Anthropogenic shorelines/ Artificial shorelines) → FM1 (Semi-confined transitional waters/ Coastal inlets and lagoons) → MFT1 (Backish tidal systems)	
	Element 3: Nature-based Solutions										
Element 1: Business Challenges	Core Business	New and improved raw materials, products and services	Actions to advance existing products, materials, and services, and to explore new revenue streams through the application of Nature-based Solutions, e.g. utilizing regenerative agriculture to enhance long-term yields and generate new/improved agricultural products.	Forest protection, restoration, and management	Grassland protection, restoration and management	Regenerative agriculture; Engineered wetlands; Grassland protection, restoration and management; Forest protection, restoration, and management; afforestation	Engineered wetlands	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Cost reduction	Actions taken to manage and reduce CAPEX and/or OPEX, improving business performance by limiting expenditure on maintenance, raw materials, regulatory compliance, etc.; e.g. using engineered wetlands to decrease cost of water treatment and maintaining infrastructure.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management, Engineered wetlands	Engineered wetlands; creation of urban green spaces; Forest protection, restoration, and management	River and floodplain rehabilitation and restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
		Increased asset value	Actions taken to improve the quality and reduce the risk profile of assets such as property, facilities, and land holdings that are impacted by natural ecosystems and processes, e.g. using mangrove restoration to reduce disaster risk for coastal facilities and properties.			Regenerative agriculture	Creation of urban green spaces; green space protection, restoration and management	River and floodplain rehabilitation and restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
		Resilience of operations and supply chain	Actions taken to improve resilience and reduce business risk, protecting companies from negative impacts such as stopped operations, damaged assets and disrupted supply chains, e.g. changing agricultural practices to use less water, increasing resilience of supply in water-stressed areas.	Forest protection, restoration, and management	Grassland protection, restoration and management	Regenerative agriculture; Engineered wetlands; Grassland protection, restoration and management	Engineered wetlands; Creation of urban green spaces; green space protection, restoration and management	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Regulatory compliance	Actions taken to comply with current and prepare for future regulations, such as air and water quality standards or required sustainability disclosure, e.g. using wetland restoration as part of treating discharged water to meet local standards.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Engineered wetlands; Grassland protection, restoration and management	Engineered wetlands	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Social licence to operate and meeting consumer expectations	Actions taken to affirm social licence to operate from local communities and consumers, e.g. through investing in landscape-scale NbS to demonstrate the company's commitment to local environmental stewardship and global sustainability efforts.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management	Creation of urban green spaces; green space protection, restoration and management; Forest protection, restoration, and management	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Increase brand value and equity	Actions to boost the monetary value of a brand and amplify the benefits gained from its recognition, e.g. demonstrating participation in landscape-scale NbS with investors, peers, and consumers.	Forest protection, restoration and management		Regenerative agriculture; Grassland protection, restoration and management; Forest protection, restoration and management	Creation of urban green spaces; green space protection, restoration and management	Lake restoration; River and floodplain rehabilitation and restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Increase circularity	Actions to minimize the waste or emissions of a company's operations and supply chain, e.g. through the implementation of circular water systems for water reuse and resource recovery in urban environments.				Creation of urban green spaces; Green space protection, restoration and management	River and floodplain rehabilitation and restoration			

The Nature-based Solutions Map

Element 2: Biomes				Forests & woodland	Savannas, grassland & deserts	Intensive land use systems	Urban and Industrial	Rivers & lakes	Wetlands	Open ocean	Coastal
		Descriptions of business challenge/ opportunity	→ T1 (Tropical and sub-tropical forests), → T2 (Temperate and boreal forests and woodlands) → T3 (Shrublands and shrubby woodlands)	→ T4 (Savannas and grasslands) → T5 (Deserts and semi-deserts)	→ T7 (Intensive land use systems) → F3 (Artificial wetlands)	→ T7.4 (Urban and industrial ecosystems) → F3 (Artificial wetlands)	→ F1 (Rivers and streams) → F2 (Lakes)	→ TF1 (Palustrine/vegetated wetlands)	→ M2 (Pelagic open waters/ open ocean waters) → M3 (Deep sea floors)	→ M1 (Marine shelf) → MT1 (Shoreline systems) → MT2 (Supralittoral coastal/ Maritime vegetation) → MT3 (Anthropogenic shorelines/ Artificial shorelines) → FM1 (Semi-confined transitional waters/Coastal inlets and lagoons) → MFT1 (Backish tidal systems)	
	Element 3: Nature-based Solutions										
Element 1: Business Challenges	Climate	Emissions avoidance/ reduction	Actions focused on avoiding operational activities with a high carbon footprint or reducing the current carbon footprint of existing operations, e.g. by conserving a forested area that would otherwise be exploited for resource extraction.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; afforestation			Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
		Emissions removals	Actions to sequester carbon from the atmosphere and store it, e.g. through new growth of biomass or soil carbon sequestration.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; Forest protection, restoration and management; afforestation	Creation of urban green spaces; Green space protection, restoration and management	River and floodplain rehabilitation and restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Climate adaptation	Actions to reduce a company's vulnerability to the impacts of climate change, e.g. through the protection of coastal ecosystems to mitigate the risk of flooding in regions susceptible to rising sea levels.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Engineered wetlands; Grassland protection, restoration and management; Forest protection, restoration and management; afforestation	Creation of urban green spaces; Green space protection, restoration and management, Engineered wetlands	River and floodplain rehabilitation and restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
	Nature (Incl. Biodiversity)	Avoid/reduce nature impacts and/or dependencies	Actions to avoid a company's future impacts or dependencies on nature and/or reduce the existing impacts and dependencies of its operations, e.g. avoiding biodiversity loss by preventing deforestation within supply chains.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; Forest protection, restoration and management; afforestation	Creation of urban green spaces; Green space protection, restoration and management; Engineered wetlands	River and floodplain rehabilitation and restoration; lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Restore/regenerate natural ecosystems	Actions to support the recovery of degraded ecosystems, e.g. reversing human-induced impacts to restore a forest habitat for native species.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; Engineered wetlands; Forest protection, restoration and management	Green space protection, restoration and management; Engineered wetlands; forest protection, restoration, and management	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management

Element 2: Biomes				Forests & woodland	Savannas, grassland & deserts	Intensive land use systems	Urban and Industrial	Rivers & lakes	Wetlands	Open ocean	Coastal
		Descriptions of business challenge/ opportunity	→ T1 (Tropical and sub-tropical forests), → T2 (Temperate and boreal forests and woodlands) → T3 (Shrublands and shrubby woodlands)	→ T4 (Savannas and grasslands) → T5 (Deserts and semi-deserts)	→ T7 (Intensive land use systems) → F3 (Artificial wetlands)	→ T7.4 (Urban and industrial ecosystems) → F3 (Artificial wetlands)	→ F1 (Rivers and streams) → F2 (Lakes)	→ TF1 (Palustrine/vegetated wetlands)	→ M2 (Pelagic open waters/ open ocean waters) → M3 (Deep sea floors)	→ M1 (Marine shelf) → MT1 (Shoreline systems) → MT2 (Supralittoral coastal/ Maritime vegetation) → MT3 (Anthropogenic shorelines/ Artificial shorelines) → FM1 (Semi-confined transitional waters/Coastal inlets and lagoons) → MFT1 (Backish tidal systems)	
	Element 3: Nature-based Solutions										
Element 1: Business Challenges	Water	Flood management	Actions to alleviate current and future flood risks and damages in flood-prone areas, e.g. by installing living breakwaters (like saltmarshes) along coastlines to absorb wave energy and decrease flood risk.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Engineered wetlands; afforestation	Creation of urban green spaces; Green space protection, restoration and management; Engineered wetlands	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
		Managing water stress	Actions to decrease the water consumption of existing operations and pre-emptively avoid high water consumption in future water-stressed areas, e.g. by using watershed-scale NbS to improve water availability.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture, Grassland protection, restoration and management	Creation of urban green spaces; Green space protection, restoration and management	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management		
		Water treatment	Actions to enhance the quality of water used and discharged throughout a company's operations and supply chain to become suitable for specific end-uses (such as discharge into the environment) e.g. the establishment of engineered wetlands that employ natural mechanisms (like wetland vegetation and soils) to treat stormwater runoff or industrial wastewater.	Forest protection, restoration and management		Regenerative agriculture; Engineered wetlands; afforestation	Creation of urban green spaces; Green space protection, restoration and management; Engineered wetlands	River and floodplain rehabilitation and restoration; Lake restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
	Equity (Incl. Social)	Employee engagement	Actions to increase the emotional commitment and involvement employees have toward their organization, as well as their enthusiasm and dedication toward their job, e.g. by designing accessible green spaces for employees to mitigate stress and enhance overall engagement and productivity.				Creation of urban green spaces; Green space protection, restoration and management				
		Improving supplier livelihoods	Actions to strengthen the capabilities and assets of suppliers both now and in the future, e.g. by adopting regenerative agriculture practices to improve production and enhance the asset value of their land.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; Forest protection, restoration and management		Lake restoration; River and floodplain rehabilitation and restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management
		Economic development for local communities	Actions to improve the economic conditions for local communities and other stakeholders in and around the company's spheres of influence and control, e.g. by engaging in lake restoration activities to boost tourism and support local fisheries.	Forest protection, restoration and management		Regenerative agriculture, Grassland protection, restoration and management		Lake restoration; River and floodplain rehabilitation and restoration	Wetland protection, restoration & management		Onshore and transitional water ecosystem protection, restoration, and management
		Human health and well-being	Actions to enhance the physical, mental, and social well-being of employees, suppliers, and local communities, e.g. by creating or restoring nature in urban areas to mitigate the heat island effect, improve air quality, and increase access to green spaces.	Forest protection, restoration and management	Grassland protection, restoration and management	Regenerative agriculture; Grassland protection, restoration and management; Forest protection, restoration and management; afforestation, engineered wetlands	Creation of urban green spaces; Green space protection, restoration and management	Lake restoration; River and floodplain rehabilitation and restoration	Wetland protection, restoration & management	Offshore ecosystem protection, restoration and management	Onshore and transitional water ecosystem protection, restoration, and management

The NbS List

NbS	Short NbS descriptions
Freshwater & wetlands	
Wetland protection, restoration, and management	Effective wetland protection, restoration, and management practices can range from spatially large-scale interventions that affect the entire wetland (such as re-establishing the hydrological connection between restored wetlands or the installation of ditches for rewetting) to small-scale interventions that only affect a part of the wider wetland area (such as changing cultivation practices in an adjacent landscape). Next to the multitude of ecosystem services that wetlands provide, effective wetland protection and restoration activities can reduce a company's impact on nature, lower maintenance and land management costs, control water quantity, and enhance water quality.
Engineered wetlands	Constructed wetlands refer to the creation of new wetland landscapes, which are affordable, artificial treatment systems that employ natural mechanisms (such as wetland vegetation and soils) to treat stormwater runoff or industrial wastewater and improve water quality.
River and floodplain rehabilitation and restoration	River and floodplain rehabilitation and restoration activities represent an integrated approach aimed at reversing artificial river modifications and restoring natural river functions. Restoring and rehabilitating rivers and floodplains involves a range of activities that companies can engage in, including the removal of legacy sediment, creating lakes or ponds in the floodplain, establishing grassy basins and swales, removing invasive species, installing and developing riparian buffers, reviving old channels or developing different water retention areas. The business benefits of these activities include (but are not limited to) flood risk reduction, water quality improvement, and groundwater recharge.
Lake restoration	The term 'lake restoration' refers to the reversal of human-induced impacts to restore a lake's former structure and functioning as a natural water retention area. Lake restoration practices can include the reduction of external nutrient loading (e.g., by modifying land-use practices in surrounding areas) or the fixation of nutrients (e.g., by enhancing sediment binding capacity). Finally, the business benefits that can be derived from lake restoration activities can be direct (e.g., enhanced water quality, carbon sink capabilities, and flood control) or indirect (e.g., irrigation, fisheries, tourism, and recreation).
Urban	
Green space protection, restoration and management	Green space protection, restoration and management techniques encompass all activities that enhance the quality, quantity and accessibility of existing green spaces in urban areas. Green space management involves safeguarding and restoring various types of urban green areas, including roadside greenery and vegetation barriers, small urban green spaces like gardens and pocket parks, green roofs and facades, parks and urban meadows, greenways and corridors for walking or cycling, coastal, riverside, or lakeside trails connecting green and blue spaces, recreational and urban gardening facilities such as community gardens, sports and play areas, and school grounds, as well as providing facilitated access to urban woodlands, forests, and natural wildlife areas. By safeguarding and sustainably managing current green areas, businesses can offer their employees various health and wellbeing benefits, mitigate the heat island effect in densely populated urban settings, and sequester substantial amounts of carbon while decreasing their impact on nature.
Creation of urban green spaces	Created urban green spaces come in many different forms and functions and include community gardens and urban farms, rain gardens, green roofs, street trees, bioswales, as well as buffer zones/strips. For businesses, new green spaces can increase property value, reduce the heat island effect in urban environments, boost staff engagement, and improve water and air quality which leads to positive health outcomes in urban areas.

<i>NbS</i> <i>Short NbS descriptions</i>	
Terrestrial	
Forest protection, restoration, and management	Forest protection, restoration (including reforestation), and management practices encompass a great variety of different activities, such as sustainable logging practices, community-based forest management, agroforestry, silvicultures, or the management of green firebreaks, watersheds and local wildlife. Investing in forest conservation and restoration practices safeguards raw materials from being depleted, increases business resilience, and helps businesses stay ahead of future policy changes aimed at protecting forests for future generations.
Afforestation	The term 'afforestation' refers to the practice of planting trees in previously non-forested areas. Well-managed afforestation can generate jobs and income (e.g., from high-quality timber sales) and also provides health benefits, an increase in supply chain resilience, carbon emissions reductions, and the substantial decrease of a company's impact on nature.
Regenerative agriculture	Despite a plethora of different definitions, regenerative agriculture aims to transition agriculture from being a primary source of environmental degradation to a primary source of regeneration of modified ecosystems. It includes a set of activities that can be employed in the same agricultural area, such as reduced or no-till farming practices, cover cropping, composting, increasing crop diversity, animal integration, managed grazing, silvopasture, and agroforestry. Regenerative agriculture can boost business resilience and climate adaptation capabilities, while also increasing crop yields, sequestering significant amounts of carbon, and decreasing water consumption.
Grassland protection, restoration, and management	Grasslands are some of the least protected and most threatened ecosystems worldwide, making grassland protection, restoration, and management practices crucial for safeguarding and reviving these landscapes and enhancing native biodiversity. Grassland restoration management strategies involve activities such as replanting with deep-rooted forbs and grasses, creating green firebreaks, implementing low-intensity grazing practices, and, where appropriate, reintroducing controlled fire regimes to stimulate nutrient cycling and increase grassland productivity. For businesses, investing in grassland protection, restoration, and management activities can sequester significant amounts of carbon, improve crop yields, and contribute to greater supply chain resilience.
Marine & coastal	
Offshore ecosystem protection, restoration, and management	Making up approximately two-thirds of the global surface area, offshore (or marine) ecosystems are typically characterized by high levels of dissolved salt and encompass the open ocean, deep-sea regions, and marine ecosystems, each exhibiting distinct physical and biological traits. Offshore ecosystem protection, restoration, and management practices include the establishment of marine protected areas and rebuilding stocks of marine life (including plants and/or animals). Businesses can benefit from these practices by producing (and selling) new raw materials and increasing their social license to operate, especially when involving local stakeholders throughout the restoration and management efforts.
Onshore and transitional water ecosystem protection, restoration, and management	Thriving at the interface between land and ocean, onshore and transitional water ecosystems are distinctive habitats shaped by plants and other organisms accustomed to the challenges of saltwater and tide fluctuations. These types of ecosystems are safeguarded, restored, and managed through various practices, including mangrove conservation and restoration, rehabilitation of coral/oyster reefs, and sustainable management of saltmarshes and dunes. Investments in these activities can sequester significant amounts of carbon, while enhancing a company's operational resilience and contributing to climate adaptation strategies. When implemented in collaboration with local stakeholders, companies engaging in onshore and transitional water ecosystem protection, restoration, and management activities can also strengthen their social license to operate and foster the creation of new or improved products.

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About Nature Action Imperative

WBCSD's Nature Action Imperative supports members to accelerate credible corporate action and mainstream nature in business strategies & decision-making: building the tools and guidance needed to define credible business contributions to Nature Positive (halt and reverse nature loss by 2030); preparing to engage with the emerging performance and accountability system for nature; and, catalyzing investments into nature assets. To learn more about the Imperative and related projects, visit www.wbcsd.org/Imperatives/Nature-Action.

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The World Business Council for Sustainable Development (WBCSD) is a global community of over 220 of the world's leading businesses, representing a combined revenue of more than USD \$8.5 trillion and 19 million employees. Together, we transform the systems we work in to limit the impact of the climate crisis, restore nature and tackle inequality.

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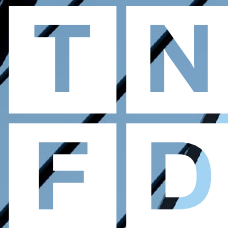
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TNFD

Discussion paper

A Landscape Assessment of
Nature-related Data and
Analytics Availability



Taskforce on
Nature-related Financial
Disclosures

March 2022

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1. Executive Summary, Recommendations & Next Steps

Data and analytics will play a fundamental role in helping companies and financial institutions to identify, manage and report on nature-related risks and opportunities (both report preparers and report users) using the Taskforce on Nature-related Financial Disclosures (TNFD) framework. Quality data, analytics, metrics and indicators are an essential foundation for quantification and analysis. Data and analytics are already being used extensively by companies to assess nature-related impacts, dependencies, risks, and opportunities. The market is moving quickly and the landscape of data platforms and sources is evolving rapidly. TNFD welcomes more data and analytics organisations moving into the nature space, but there are still many gaps and differences in terminology. It is hoped that, with the efforts of the TNFD and standards bodies, more consistency and alignment will come.

This paper provides two hypothetical case examples for forests and water – WoodNCo and SocietyInvest – to show how data and analytics can be used in the TNFD nature-related risk and opportunity assessment process (LEAP). The LEAP process provides a staged process to **Locate** interactions with nature, **Evaluate** impacts and dependencies, and **Assess** risks and opportunities, before **Preparing** to manage and report on material risks. The forests example is provided from the perspective of a ‘report issuer’, and the water example is provided from the perspective of a ‘report user’. The case studies revealed the following key gaps and limitations:

- i. Data and analytics coverage differs across nature realms, biomes and ecosystem types;
- ii. Variances in measurement approaches underscore the need for standardisation;
- iii. Spatial and/or temporal biases in data pose challenges;
- iv. The accessibility and relevance of data remains limited; and
- v. These culminate in report issuers facing challenges in disclosing information in a consistent format that can be used effectively by report users to assess the extent to which they are effectively managing nature-related risks and opportunities facing their business operations.

This paper also provides the result of a mapping of a number of data platforms and sources to identify where they can support different phase and steps in a LEAP assessment. This mapping has been rapid and is not comprehensive. One important data and analytics requirement is for a report preparer to have an inventory of physical assets and operations mapped to natural

assets by specific location (ecosystems and biomes). While we recognise that this type of location-specific analysis will be new for the majority of market participants, some companies have already developed analytic tools and capabilities for this internally and there are emerging third-party solution providers who are building data sets and tools to support this kind of analysis.

Based on the two case examples and the landscape mapping of data platforms and sources, this paper identifies emerging data trends, gaps and limitations, and priority areas for further work on data and analytics. In assessing limitations associated with data availability, the following important considerations were revealed:

- The interchangeability of terms related to data poses challenges as its interpretation may vary, underscoring the need for standardisation;
- Differing perspectives and priorities conflate different metrics, and there is not a clear distinction between data and metrics/indicators;
- Drivers of nature loss and risk (dependencies and impacts on nature) are highly location specific; and
- The lack of understanding of how the information derived from data can be used by decision-makers is more of a challenge than shortage of data.

We expect the field of nature-related data and analytics, including location-based analytics, to advance quickly over the next 1-2 years and, as a next step in the work of the TNFD, we will be supporting the efforts of commercial and non-commercial organisations in further enhancing and developing data to be more consistent, more comprehensive (for example, filling gaps such as data on the ocean realm) and to support and align to the TNFD framework. TNFD would welcome engagement on areas identified for further discussion and work, including: centralising nature-related data platforms; tapping into and accelerating decision-useful data innovation and developments; and, building technical expertise, resources, and capacity for collection and analysis of high quality, robust nature-related data.



2. Introduction

Data and analytics availability and capability are critical success factors for the achievement of the TNFD's goal to provide a framework for organisations to report and act on evolving nature-related risks and opportunitiesⁱ. As the Dasgupta Review on the Economics of Biodiversity highlighted, standardised, credible, decision-useful data is required to underpin global standards that enable companies and financial institutions to report and act on nature-related risks and opportunities.

Data availability, quality and ease of use will be driven by the development of metrics and indicators; the growing adoption of nature-related targets in corporate strategy and reporting; and innovation of new tools, services and capabilities.

The objective of this initial discussion paper by the TNFD is to explore the following foundational issues and solicit feedback from market participants about:

- The types of nature-related risk and opportunity data currently available and needed in the future;
- The interconnection and interdependence of various data tools, platforms and methodologies in the market today and under development;
- The data covered in these data tools, platforms and methodologies, and its relevance, accuracy, and temporal consistency;
- Where the TNFD sees key gaps in the data landscape today; and,
- Guidance and recommendations on how end-users can currently interact with and use data and analytics tools in order to get started, recognising that this space is moving quickly from both the demand side (new reporting and disclosure expectations) and the supply side (new data sets, platforms, sources, metrics, tools and services emerging from a range of established and new data providers).

The TNFD acknowledges the substantial effort from other organisations, initiatives and groups who have previously conducted and published thorough reviews of this data landscape, such as UNEP World Conservation Monitoring Centre (UNEP WCMC), World Wildlife Fund (WWF), the World Bank, and Global Canopyⁱⁱ. We have drawn heavily on this work, together with consultation of TNFD Taskforce Members, and members of the TNFD forum, including knowledge partners and other stakeholders to characterise what the existing nature-related data landscape looks like and some of the key challenges ahead, for the data system in general and for TNFD in particular.

It is important to note that this rapid landscaping work is non-exhaustive and will continue. It is intended as an overview of the nature-related data landscape to prompt further questions, and input from – and discussion with – market participants. Through dialogue with the market, it is our hope to bring new data sources and platforms to light, and to ensure the data needed is available to enable companies to implement the TNFD framework, both in the initial phase of beta development and pilot testing and longer term once the TNFD recommendations have been published in late 2023.

This paper also touches on emerging trends in data and analytics – for instance, the use of artificial intelligence (AI), and developments in remote sensing, geospatial technology and environmental DNA (eDNA) capabilities – that can help businesses use the TNFD framework and manage and disclose on nature-related risks. We also consider the merits of developing decentralised data exchanges that pair open-source with commercially-enhanced technological capabilities. It should be noted that there is a growing digital frontier of nature-related data which has resulted in a diverse set of online platforms and tools tailored for specific uses. These platforms and tools have different aims, audiences and information. Ultimately, nature-related, decision-useful data needs to be scalable, high quality and regularly updated, enabling users to identify and manage risks and opportunities, and make decisions to avoid, reduce, restore, regenerate and transform where appropriate.

2.1. Initial fundamental observations on terminology and spatial data

Our initial review of the data landscape for nature-related risk and opportunity assessment and disclosure has led us to two high-level initial observations:

- **Developing a common market terminology:** The use of differing and seemingly interchangeable terms relating to nature-related data could hinder interpretation of disclosure recommendations, emphasising the need for standard definitions. Present market practice means that differences between user perspectives and priorities may in some instances misinterpret how a variable is defined – a metric may be used as an end in itself for decision making without a full comprehension of the underlying data. The TNFD has developed an analytic construct for market participants to understand nature, including a set of definitions, and will continue to refine this with the benefit of feedback from market participants and specialist knowledge partners.
- **The fundamental importance of location and spatial data:** The drivers of nature change and nature-related dependencies and impacts for companies and investors are highly location specific. As a result, the spatial location of a company's direct assets and operations and its supply chain locations is fundamental to an accurate assessment of nature-related risk and opportunity to the company, investment portfolio or loan book. The TNFD acknowledges that geo-spatial analysis – combining company operating data with the condition of the ecosystems on which those operations depend and impact – is currently difficult and that disclosure of asset location data may prove challenging for companies with complex supply- and value-chains. Even understanding the spatial location of a company's assets can be inadequate without

contextual attributes associated with the asset, such as whether they are offices or production facilities, the production volumes and specific production processes etc. Nevertheless, this sort of analysis needs to be developed and widely accessible for nature-related risk and opportunity analysis to be meaningful and achievable from a disclosure perspective. That presents a near-term challenge for report preparers and users but also a significant innovation and market opportunity for data and analytics providers. Where asset location data are unavailable, users will need to rely on models or proxies which may not recognise specific measures in place by portfolio companies to mitigate nature risks. Integrating multiple data sources may also make portfolio level analysis more challenging.



3. Our approach to assessing the data landscape

The data, analytics and metrics required to assess an organisation's dependencies on nature, its impact drivers, and the impacts of its operations on environmental assets vary greatly and is shifting quickly. It depends on factors such as geographic location, scale, and sector. Understanding the risks associated with nature loss requires a number of specific indicators, representing distinct but often interlinked and emergent phenomena. Nature is location-specific and non-fungible, and therefore the state of environmental and ecosystem assets and ecosystem services must be assessed in context, with consideration of cumulative impacts, historical and future conditions, and cause and effect relationships taking place at different spatial and temporal scales.

Aligned with the framework under development by the TNFD - namely the TNFD's conceptual construct for 'understanding nature' for market participants; its draft disclosure recommendations and the TNFD's recommended process for nature-related risk and opportunity and assessment known as LEAP, there are, in broad terms, three types of metrics and data the TNFD is focusing its efforts on:

- Dependency metrics and data;
- Impact metrics and data; and,
- Risk metrics and data.

The main challenge associated with the assessment of nature-related risks and opportunities and its disclosure thereafter is not a lack of data, but rather how measurements are interpreted as well as elements such as accessibility, quality, format, relevance, scale and transparency.

Furthermore, these aspects of the data landscape today differ markedly across the TNFD's identified building blocks for understanding nature - realms (terrestrial, oceans and freshwater), ecosystem types (biomes), environmental assets, ecosystem services - and by geographic region. Consequently, market participants have found it difficult to undertake comprehensive assessments of nature-related risks and opportunities and current disclosures by companies and financial institutions are partial, fragmented and inconsistent. There is no uniform approach to data standardisation and aggregation of relevant data in a way that provides decision-useful information across sectors and geographies.

3.1. Data types

Generally, nature-related data can be classified as follows:

- Asset location (site specific, including physical and natural assets – by biome or ecosystem, supply chain, sector specific);
- Observational (spatial, dynamic/real time, aspatial); and,
- Modelled (analytics, simulation, forecasting).

The criteria for selection and use of methodologies, platforms and tools, included the following considerations: Relevance; Resolution and scalability; Temporality; Frequency of update; Geographic coverage; Accessibility; Comparability; Thematic coverage; and Authoritativeness, including traceability. These are covered in more detail in Annex 1.

3.2. Data uses and challenges

Data are used in three ways:

- As inputs into the analytic process for understanding nature-related risks and opportunities;
- As outputs for the purposes of reporting and disclosure; and,
- For specifying, and assessing progress towards targets.

Data and analytics platforms integrate various data sources to enable assessment of natural capital dependencies and impacts, and supply- and value-chain mapping.

Some data providers provide portfolio level information on nature-linked controversies, assessments of company biodiversity policies, etc. Such information will be useful data “input” for financial institutions considering their own nature-related metrics, but also highlights the importance of being able to distinguish between data and metrics/indicators and how metrics and indicators have been derived (i.e., the underlying data, assumptions used in analysis etc.).

There is no shortage of nature-related data but rather a lack of understanding about how data can be used to derive information that is decision-relevant to end users. Deciding which data is accessed will be dictated by what is deemed relevant as metrics for use in applying the TNFD framework. It is clear though that end-users will in the near-term have to rely on data and information from sources other than corporate disclosure.

As disclosures mature, users may be able to validate or test the accuracy of modeled data with corporate disclosures, although there will likely always be a time lag between disclosed nature-related data and what can either be modelled or measured. This is because company reporting cycles are typically one year historic, so information in disclosure may be out of date when a user is assessing it. Users will therefore ideally need access to real-time or near real-time data from data providers.

3.3. Data tools in use today

Here we provide the results of a mapping of a number of data platforms and sources to identify where they can support different phases and steps in a LEAP assessment. This mapping has been rapid and is not comprehensive. Table 1 focuses initially on water and forest related data, and provides signposts to a selection of data tools that are currently available as options that report preparers and users may find helpful during the LEAP process, including for disclosure preparation.

The assessment was not comprehensive, nor does the TNFD endorse these data tools or suggest they are preferred over other data tools that are available. Preparers and users may wish to use this list as starting guidance but should conduct their own assessment of available tools and arrive at their own conclusions on which will be most appropriate to use for their organisation given their business model and reporting needs.

Some of the tools referred to in the table are referenced throughout this paper as illustrative use cases. The TNFD does not propose to make specific recommendations on which methodologies, platforms or tools should be used in deploying the TNFD framework. Where specific tools are discussed in the case studies within this discussion paper, these references should be interpreted as potential options only.

Table 1 Data platforms and sources that can support different phases and components in LEAP process (not comprehensive)

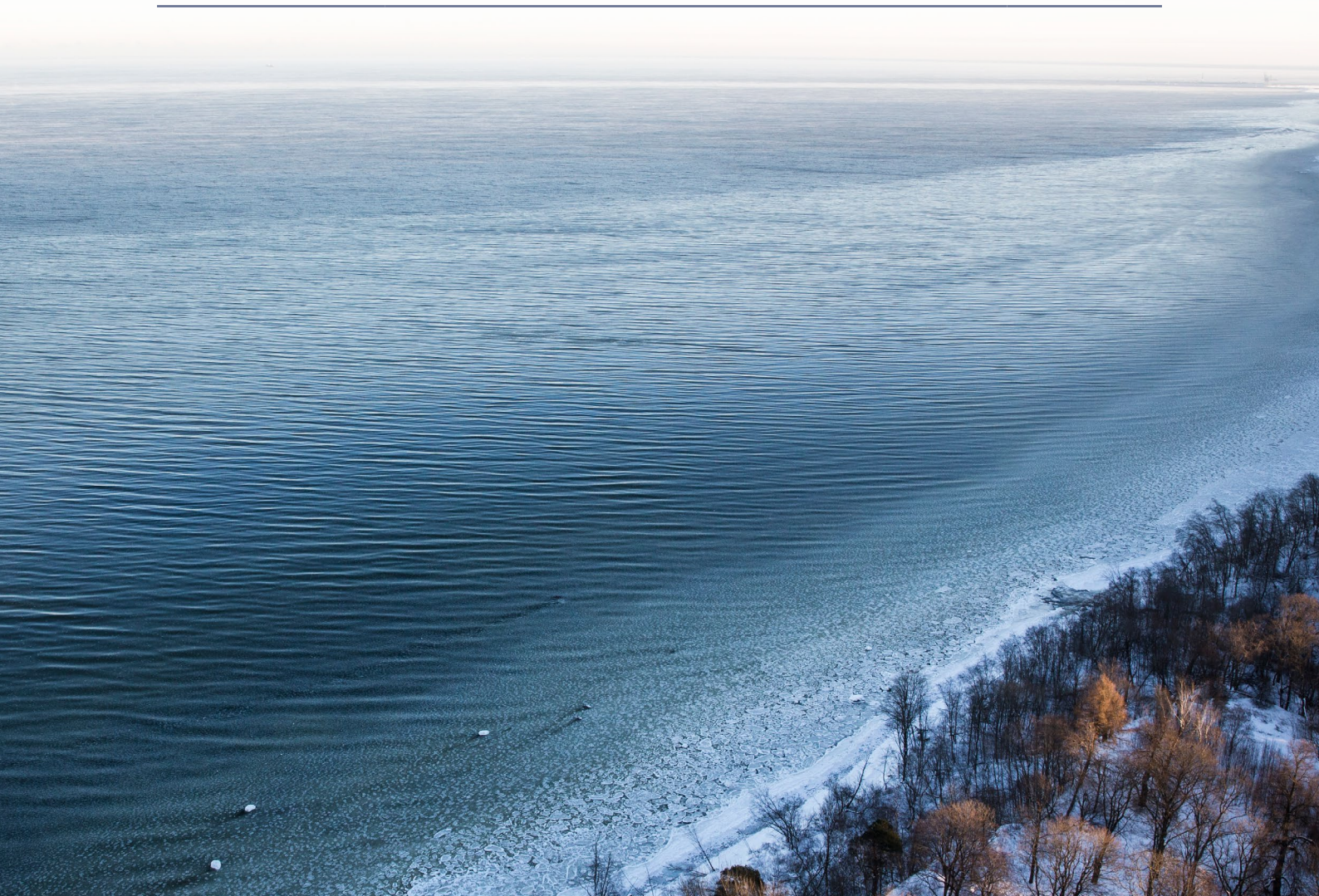
Tool	Description	Step(s)/ Component(s)
Collect Earth	Satellite imagery viewing tool. Specialty in monitoring land use change.	L2, E4, Locate, Evaluate
Ecolab Water Risk Monetizer	Quantifies the full value of incoming and outgoing water to a specific location based on basin-level quantity and quality considerations.	L2, A1, Locate, Assess
EcoVadis	Access ESG ratings upstream and downstream in the value chain, for a range of organisations engaged with the tool.	L4, E3, E4 Locate, Evaluate
GEMI Local Water Tool	Evaluate the external impacts, business risks, opportunities and management plans related to water use and discharge at a specific site or operation.	E4, A1, Evaluate, Assess

RBA Country Risk Assessment Tool	Identify inherent risks within supply chains.	L2, E1, E2, Locate, Evaluate
SEDEX RADAR Tool	Identify inherent risks within supply chains, including Water and 13 other potential issues, based on geography and sector.	L2, E1, E2, Locate, Evaluate
Water Footprint Network Assessment Tool	Quantity water consumption and sustainability based on geography and use data.	E4, P4, Evaluate, Prepare
WRI Aqueduct - Water Risk Atlas	Identify and evaluate water risks based on geography, including geospatial data of water-stressed regions that can be overlaid with operations/supplier locations.	L3, E3, Locate, Evaluate
WWF Water Risk Filter	Explore water risks (physical, regulatory, reputational), assess these across the value chain, and identify potential mitigation actions.	L4, A1, A3, Locate, Assess
Exiobase	Multi-regional environmentally-extended input-output databases can be used to estimate environmental impacts based on sector and geography. Can also be used to estimate supply chain sector/geography breakdown, and relative impacts.	L1, L4, E4, Locate, Evaluate
Ecoinvent	Life Cycle Inventory (LCI) data to support sustainability assessments such as Life Cycle Assessments (LCA). This data can be used to support quantification of impacts throughout the life cycle stages of a product or service.	E4, Evaluate
FAO/ AQUASTAT	A tool that collects, analyses and provides free access to over 180 variables and indicators by country from 1960.	E3, E4, A1, Evaluate, Assess
India Water Tool	Specific to India, this geospatial tool provides access to water-related datasets and risk indicators.	L3, E1, A1, Locate, Evaluate, Assess

Maplecroft Global Water Security Risk Index	Access to the Water Stress index that evaluates total water use relative to annual available flow on a catchment level across the globe, enabling users to assess inherent water stress in a particular business location.	A1, P4, Assess, Prepare
ENCORE	Geospatial datasets on natural capital assets and drivers of environmental change, and qualitative impact/dependency ratings that link ecosystem services to production processes.	L2, L4, E1, E2, Locate, Evaluate
FAO WaPOR	Indicator for selected regions, showing the annual Gross Biomass Water Productivity expressed as the quantity of output (total biomass production) in relation to the total volume of water consumed in the year (actual evapotranspiration).	A1, A3, Assess
Global Wetlands geospatial data	Geospatial wetland data, searchable by country and type of wetland.	L2, L4, E1, E2, Locate, Evaluate
Freshwater Ecosystems Explorer	Understand the state of fresh water ecosystems, in geospatial time-series data that is considered accurate, up-to-date, high-resolution.	A1, A3, Assess
Natural and Mixed World Heritage Sites data	Geospatial data for UNESCO World Heritage sites that can be overlaid with operations/supplier locations, to screen for sites that sit in these locations.	L2, L3, Locate
IBAT	Geospatial data to identify where operations/supplier locations sit in areas of interest such as Key Biodiversity Areas.	L2, L3, Locate
RepRisk controversy data	Third-party controversy data on a range of ESG topics, to support tasks such as materiality assessments, due diligence and monitoring.	E1, E2, A3, Evaluate, Assess
Rezatec Geospatial AI	Geospatial AI data that enables remote monitoring of water infrastructure and water catchment areas, water quality, pipeline risk etc. Aside from Water, there are also datasets available for Forestry, Agriculture and Energy.	E1, E2, E4, Evaluate

Swiss Re's CatNet	Geospatial tool to identify and assess natural hazard risk, including the Biodiversity and Ecosystem Services (BES) index.	L4, E1, E2, Locate, Evaluate
Biome geospatial data from National Geographic Tool	Visual map of biomes, to support identification of relevant biomes that operations/supply chains impact and/or depend on.	L2, P4, Locate, Prepare
Copernicus	Synthetic Aperture Radar (SAR) Analysis Ready Data (ARD) on land use mapping, including hotspotting of environmentally stressed areas.	L2, E4, Locate, Evaluate
Global Risk Assessment Services (GRAS)	Third-party assessments using GIS and remote sensing technologies to move toward transparent and deforestation-free supply chains.	E4, A1, A2, Evaluate, Assess
Preferred by Nature - Sourcing Hub	Identification of risks e.g. through the use of the Timber Risk Score that provides country-level qualitative scores on the potential extent of illegal timber practices.	L3, E1, A1, Locate, Evaluate, Assess
Beef on Track	Platform collating systems, tools, data and technical information to support organisations in creating a deforestation-free beef chain in the Amazon.	E4, Evaluate, Prepare
Starling satellite imagery	Satellite imagery tool to support supply chain impact assessments on deforestation.	L3, E1, E2, E4, Locate, Evaluate
Proforest	Commodity-specific toolkits that can support organisations to map out forest-related risk in supply chains.	L1, Locate
AFi	Guidance on transparency within forestry and agricultural commodity supply chains.	L1, L2, Locate
Science-Based Targets for Nature	The SBT for Nature guidance provides sector and sub-industry guidance on identification of direction operation and wider value chain impacts. Note that the guidance for SBT for Nature is currently in consultation and will be updated over time.	E1, Evaluate

Environmental Justice Atlas	Can be used to map socio-environmental conflicts, and understand key socio-environmental risks related to forest-risk commodity production in specific regions.	E2, Evaluate
Global Forest Watch	Geospatial data for monitoring companies and portfolios in forest-risk commodity supply chains. Can be used to build understanding of the extent of deforestation in forest-risk commodities and financing, focusing on the state of forests and the pressures.	E2, E4, Evaluate
Land Portal Geoportal	Geospatial data layers on forest tenure, land and corruption, forest landscape restoration and indigenous and community land rights.	L3, E1, Locate, Evaluate
MapBiomass	Historical land cover and land use data, covering Brazil, the Amazon and the Gran Chaco. Allows visibility of deforestation over time.	L2, E2, Locate, Evaluate
Trase	Maps forest-risk supply chains linking consumer countries and traders with places of production. This allows greater visibility of the countries, regions and companies that have higher rates of deforestation.	L2, E2, Locate



4. Exploring current data challenges – A Case Study approach

To explore current challenges and future priorities in the nature-related data landscape, this paper has adopted a case study approach. The following case studies explore challenges, key issues and potential data development opportunities through the lens of the TNFD's beta risk assessment process for nature-related risks and opportunities, known as LEAP.

LEAP is a recommended step-wise internal analytic process to help report preparers and financial institutions assessing nature-related risks across investment portfolios and loan books. The LEAP process involves specific analytic assessment steps in four phases as follows:

- Locate your interface with nature;
- Assess your nature-related dependencies and nature impacts;
- Evaluate your nature-related risks and opportunities; and,
- Prepare to respond and report on nature-related risks and opportunities.

The Forests example is provided from the perspective of an 'issuer', whereas the Water example is provided from the perspective of a 'user'.

Case studies

Forests and water were chosen as suitable use case examples for this discussion paper because the related impacts, dependencies, risks and opportunities are relatively well understood and considerable work has already been done by a number of organisations, in some cases for over a decade, in the areas of water and forest-related metrics and data. We highlight the importance of data availability for assessing the state of environmental assets and changes in that state, the location of business assets of companies, the locations of delivery of the companies' products and services, and related dependencies (ecosystem services) and impact drivers e.g. water consumption and land use. The case studies reference a number of methodologies, platforms and tools, to illustrate how available data can (in its current form) be used by businesses to manage and disclose their dependencies, impact drivers and impacts on environmental assets, as well as how users,

such as financial institutions, rely on both information and metrics disclosed by businesses and proxies from models and data platforms to understand exposure and risk within their portfolios. The illustrative examples of methodologies, platforms and tools were drawn from a long-list referencing existing reviews and input from TNFD members, knowledge partners and interested stakeholders.

4.1. Case Study 1: Forests – Issuer Example (WoodNCo)

Introduction

WoodNCo is operating in two industries: forest resources and forest-sourced construction materials.

- Its forest resources business includes the management of company-owned forests, which in part feeds into its forest-sourced construction materials business.
- Its forest-sourced construction materials business includes the manufacturing of logs (producing timber, engineered wood) and other products (plywood, fibreboard, processed wood e.g. floors and doors). It sources its logs through a combination of its company-owned forests and procurement from external suppliers.
- Where raw materials are sourced from external suppliers, the company relies on tier 1 suppliers disclosing data and providing certifications to ensure sustainable sourcing. The company does not have good visibility of tier 2 suppliers or beyond.
- At a site level, the company-owned forests are subject to local regulations which include environmental assessments of direct operational impacts.

Locate

At an enterprise level, the company identified the biomes that it operates in, using online data tools such as ArcGIS's WWF Terrestrial Ecoregions of the World tool. It cross-checked these findings with its own teams in each operating country. It found that its operations are within the following biomes:

- Temperate coniferous forests in Canada and Sweden;
- Temperate broadleaf forests in Russia, Finland, Sweden and Turkey; and,
- Tropical rainforests in Indonesia and Brazil.

The company maintains asset location data, such as forest tenure polygons, manufacturing facilities (mills) and associated attributes such as volumes of procured fibre and production levels. In addition to the company's forest inventory mapping, WoodNCo also subscribes to geospatial data provided by the state and federal government that identifies features such as

protected areas, special management zones for areas with high conservation value (e.g., nest locations, old growth management areas, wetlands and riparian reserves, locations of species of concern, and protected wildlife habitat). Where regional data on species of conservation concern are unavailable, it uses tools such as IBAT to support this assessment. The company then assesses the overlap of asset locations with features representing areas of high conservation concern to prioritise locations that are potentially in a state of high or extreme stress.

Gaps and challenges in the Locate stage

There are a number of biome classifications that are referred to in online data tools, and the company was uncertain on which to choose. The company aligned to the TNFD definitions of biomes to ensure alignment to other companies in TNFD disclosures. TNFD disclosure users – such as investors – may find it challenging to interpret preparers' disclosures where there is inconsistency in the terminology used, however organisations may determine that it is appropriate to report in multiple taxonomies or terminologies where stakeholders require this.

Issuers and users may not have sufficient geospatial data of operations/supply chains to make informed assessments. This may be a result of difficulty in collating the data, or that it is sensitive and cannot be disclosed. There are potential solutions from data providers such as GISTImpactⁱⁱⁱ that can provide estimated geospatial data at an asset level for a top-down approach. To achieve best practice, issuers should engage suppliers and country-level operations in the data collection process to enhance primary data and disclose this to the highest accuracy that is feasible.

Evaluate

The company sought to identify its key dependencies and impacts on nature, for its activities in the forest resources and forest-sourced construction materials businesses. At the enterprise level, it used ENCORE^{iv} to identify the ecosystem services that it is dependent on or impacting, and identifying the state of natural capital and environmental assets in its operational countries.

The company identified High-Very High materiality **impacts** on species (particularly when considering 'range rarity' metric for Indonesia), soils and sediments.

The company identified Very High **dependencies** across a number of ecosystem services. Its key ecosystem service was found to be fibres and other material (its direct physical inputs) and soil quality (enabling the production of logs).

The company has regulatory permitting requirements for its own operations. These environmental impact assessments will require site-level identification and monitoring of environmental impact, along with management plans. Prior to approval of harvesting permits, the company locates its proposed harvesting activity, identifies any environmental assets that may be impacted, and demonstrates its management plan to avoid impact (e.g., reserve areas, buffer zones, activity timing windows).

The company's forest management plan demonstrates harvesting volumes are balanced by timber growth and reforestation activities, as well as reforestation with tree species that

are representative of current natural managed forests or resilient forests under future climate conditions. This supports the organisation to evaluate its gross negative and gross positive impact.

For one site, the company's harvesting permit requires them to monitor water quality impacts. To do this, they are collecting water samples to test turbidity, temperature, and assaying environmental DNA (eDNA) to detect and identify species present and compare back to reference samples.

At an enterprise level, the company then collates its findings to categorise its owned forests – and Tier 1 supplier forests, where possible - into three levels: “planted forests”, “natural forests”, and “biodiversity-protected areas”. The company identified its direct input dependencies using primary harvesting and procurement data.

In addition to maintaining regulatory compliance, the company holds internationally recognised sustainable forest management certifications for its managed lands and sustainable fibre sourcing and chain of custody certifications for its mills and manufacturing facilities. WoodNCo also has a policy to procure logs and other fibre from certified suppliers; any uncertified content is evaluated through a due diligence framework that avoids fibre from controversial sources.

The company relies on certification to demonstrate sustainable forest management in its operations and to ensure a minimum threshold of sustainability is accounted for in the supply chain. Nevertheless the company recognises that certification alone does not provide comprehensive data on cumulative impacts, and the company's contribution to impacts on habitats and biodiversity at a regional scale.

Gaps and challenges in the Evaluate stage

The company identified many ecosystem services and environmental assets that it is dependent on and impacting. It was difficult to prioritise these at the enterprise level without further assessment of each, which it considered to be beyond its feasible resource capacity and expertise unless further skills can be obtained or procured.

For the purpose of its TNFD assessment, it worked with its country-level teams and external experts to prioritise its key dependencies and impacts. The detailed Evaluate and Assess stages were focused on the highest priority dependencies and impacts, based on the prioritisation Step 3 under the Locate stage. The company shared its justification for prioritisation along with its findings, based on Phase Zero and Phase 1 of the LEAP process.

The company considered it challenging to assess the extent of its impact and dependency on underlying environmental assets, to arrive at a prioritisation and evaluation of the top impacts and dependencies. Where primary data was not available for a sufficient evaluation, the company sought relevant secondary data and provided a qualitative review of impacts and dependencies. Tools such as ENCORE provide qualitative ratings that can form the basis of this type of prioritisation, with results then being tested and refined with internal and external stakeholders.

WoodNCo relies on tier 1 suppliers providing external certifications. While this may serve to ensure some minimum standard is met, it does not provide a comprehensive view of impact, nor assurance on risk mitigation to minimise risks passed through the value chain (which is to be discussed in the Assess stage of the LEAP process). Further, certifications are limited in their scope, and reliance on forest certifications alone may not account for unintended impact to other elements of nature, including biodiversity. Where possible, organisations should look to disclose the spatial locations of owned and supplier-owned forests, and provide assessments to demonstrate the extent to which its operations and supply chain are contributing to nature impacts at these locations.

While the company was able to demonstrate sustainable harvest yields and reforestation associated with its operations, it did not assess indirect impacts on species abundance and biodiversity. Further, in Indonesia and Brazil it is unclear whether the company's activities are having a positive, nil or negative impact on species of conservation concern. The individual contribution of the company to these impacts is challenging to assess at each location and requires an understanding of the cumulative impacts associated with other organisations operating in the area. The company therefore supports regional and national initiatives that consider jurisdictional-level and local ecosystem level assessments including field monitoring and time-series satellite data, in the context of emerging global, national and local nature and biodiversity targets.

WoodNCo acknowledges and reports on potential issues such as unauthorised land. In this case, unauthorised land use might be due to deforestation, road construction, plantation expansion, open cast mines etc., identified by using tools such as GSI's LandNow^v. This acknowledged that there are potential risks and impacts beyond those evaluated and assessed in detail, and demonstrates intention to further explore and mitigate these. This transparency is welcomed within disclosures to support the evolving practices as nature-related disclosure maturity increases.

Assess

The company sought to assess key risks and opportunities, based on dependencies and impacts identified from the Evaluate stage. As outlined in the LEAP process, WoodNCo first reviewed its existing risk management and mitigation actions and then additional steps it could take and the material risks that would likely need to be disclosed to investors.

In the Locate and Evaluate stages, WoodNCo used tools such as IBAT^{vi} and Global Forest Watch^{vii} to develop a baseline view of natural capital in each of its operational locations and across its supply chain. Where feasible, this was enhanced using observational/measured data in collaboration with other stakeholders, but this was limited and WoodNCo identified the need to collect enhanced data for subsequent assessments. Having established a baseline, WoodNCo can use this in the future to identify changes, and look to establish if mitigation actions are minimising or reducing risk.

The company used its own harvesting and procurement data to assess its extraction from

owned and supplier-owned forests. This provided a way to assess gross extraction of its key environmental asset. The company compared this to its gross planting and growing data, from owned and supplier-owned forest data. It found that there was a small net decrease in forest (measured by m²) based on extraction versus planting. Further, it considers the loss of primary forest as irreplaceable by new forest (but found this was not a significant issue within its own operations or with suppliers).

The company used geospatial observational data to determine if its suppliers' activities appear to overlap with illegal deforestation zones, or not. Where there were possible issues, the company was able to engage with the supplier on the importance of sustainable practices.

In terms of additional risk management and mitigation actions available to the company, a number of opportunities were identified by the WoodNCo team:

- To ensure all new supply contracts stipulate agreements on zero tolerance of illegal logging, and actions to support this;
- The use of blockchain for tracking its own and supplier-sourced products in a decentralised manner. This approach meets emerging demand from downstream in the value chain (e.g. retailers, consumer preferences) for identifying sustainably sourced products, and removing the risk of laundered goods. Further, it will build confidence in users - e.g. investors - in the visibility and risk mitigation in place, preventing future controversies and reputational risk;
- The possibility to claim net neutrality in the future with regards to its nature impacts. In this case, it would need to demonstrate compensation efforts e.g. nature-based solutions and provide evidence on how these impacts are appropriate to compensate for gross negative impacts;
- A decision to start collecting primary data on reforestation and soil carbon initiatives, to support future assessment; and,
- The opportunity to contribute to regional or national priorities such as conservation efforts and participate in regional scale initiatives/funding that may be beyond direct business activities and impacts.

Gaps and challenges in the Assess stage

WoodNCo found that assessing the effectiveness of its management strategies was challenging in the absence of granular, live data with the help of online tools. This is an issue for the company and users of its disclosures as it is more difficult to identify where mitigation is sufficient, and to what extent it is minimising risk. The company seeks to build best practice into its processes over time by using regularly-updated geospatial data to support its assessments of illegal deforestation in the future, for its owned and supplier-owned forests. This may include real time monitoring by satellite remote sensing, complimented by earth-based sensors to create live-stream updates e.g. procurement of data from organisations such as Planet^{viii}, GHGSat^{ix} and Grundo^x. Further impact assessments could be augmented with eDNA e.g. NatureMetrics^{xi} and/

or lidar data feeding machine learning predictive analytics as used by Sylvera^{xii}.

In the absence of this data, WoodNCo could employ precautionary approaches to mitigate the associated risks including requirements for specific external certification and/or third-party assurance (where possible), qualitative assessments, and actively engaging with operational/suppliers assets where there are no credible action plans in place.

WoodNCo also considered that some operating countries have endorsed the “Glasgow Leaders’ Declaration on Forests and Land Use” and the consequences such as regulation and legal concessions remain uncertain for the company, both in magnitude and timescale. To mitigate uncertain transition risks, WoodNCo executives agreed to take a conservative approach by transitioning activities and/or suppliers that do not currently align to the general direction set by world leaders in commitments that lead to mandatory regulations and increased transition risk.

The desired outputs of the assessment may be different for a preparer versus a user. A user – such as a financial services loan provider – may place substantial significance on the potential short-term value erosion activities e.g. stability of ecosystem services that are direct inputs. On the other hand, the preparer may focus on mid- to long-term impacts and opportunities. These conflicting focuses should be considered by preparers. Further, preparers should seek to enable comparability and transparency in disclosures, to support itself and users in assessing the company’s risks and opportunities from an external perspective.

Some data tools may be behind paywalls for commercial use. This means organisations have to pay for the vast data available and collated into business-ready information, which may be a constraint for some potential users. Organisations may be able to identify solutions such as working in partnerships or wider initiatives. This paywall may be a constraint for some organisations without existing data access, or financial means to acquire it, or resource capacity to be involved in wider partnerships/initiatives.

Prepare

Having evaluated its impacts and dependencies, and assessed the risk and opportunity, WoodNCo prepared disclosures to share its findings with report users. WoodNCo disclosed its findings in its annual mainstream financial reporting, annual report and investor-specific communications. It disclosed on its most material/relevant risks in detail, while ensuring transparency on its process to determine and justify this approach.

The company disclosed relevant metrics that it intends to use for subsequent assessments and monitoring, relevant to itself and to disclosure users e.g. metrics that can be aggregated at an industry or user-portfolio level.

Summary of gaps and challenges identified by WoodNCo

- Various terminology classifications – report preparers and issuers should communicate and use the same definitions, following the TNFD framework;
- Lack of geospatial data for both operations and supply chain activities upstream and downstream;
- Vast scope of natural capital so prioritisation is required – this can be based on the initial Phase Zero of the LEAP process;
- Assessing the quantitative extent of impact or dependency;
- Reliance on supplier data e.g. certifications;
- Ability to measure indirect impacts, beyond what is more ‘easily’ measured;
- Real-time monitoring of natural capital;
- Uncertainty in transition risk magnitude and timeframes;
- Preparer vs user preferences in disclosures; and,
- Paywall restrictions for the commercial use of nature-related data and non-transparent methodologies (this is true for other industries).

4.2. Case Study 2: Water – User Example (SocietyInvest)

Introduction

SocietyInvest Bank is a diversified financial services firm with a specialization in the food and agriculture sector. SIB is concerned that the sector – and therefore its exposures to companies within the sector – may be exposed to high nature-related risk, particularly in relation to water issues. To evaluate its exposure, SIB carried out its own assessment to identify key risks and opportunities associated with its different exposures to food manufacturing companies.

Locate

With respect to its investment portfolios in its asset management business, SocietyInvest collects geospatial asset-level data as part of its pre-transaction due diligence and decision-making process. This data is sometimes provided by a portfolio company itself, and in absence of this data the company uses publicly available data and third-party geospatial data (e.g. GISTImpact^{xiii}) to estimate asset level locations. Accessing location data upstream of the portfolio companies, e.g. supplier assets, is challenging and the company relies on country-level estimates of supplier locations using input-output modelling, with data from providers such as Exiobase. It should be

noted that input-output modelling is a tool used by SocietyInvest predominantly in the Evaluate stage of the LEAP process to assess the size and scale of impacts, but its results also support this country-level location estimation during the Locate stage.

Where primary geospatial data was available, the WRI Aqueduct Water Risk Atlas was used to estimate the percentage of its companies' activities in water stressed regions. Approximately 10% of SocietyInvest's funds were found to be invested in Spanish food manufacturing companies operating in regions that are considered extremely water stressed. Through tools such as the WRI Aqueduct Water Risk Atlas, factors contributing to the region's high water risk rating were identified as:

- The ratio of total water withdrawals to available renewable surface and groundwater supplies;
- The ratio of total water consumption to available renewable water supplies; and,
- High inter-annual variability and high drought risk; and high coastal eutrophication potential affecting water quality.

With respect to its lending portfolios, SocietyInvest undertakes initial screening for nature-related 'red flags' through its established Environmental and Social Risk Management framework (ESRM) including sector specific policies related to topics such as forestry and fisheries. This sets relatively basic minimum standards where assets interact with nature (e.g. signalling 'red flags' where SocietyInvest's lending activities may interface with areas such as biodiversity hotspots, UNESCO biospheres, RAMSAR wetlands and other areas of high ecological value. IBAT and InVEST were tools used to support this assessment).

SocietyInvest also screens potential lending exposures with controversy data, as part of its effort to identify potentially relevant assets and ecosystems. The company used its in-house tool that is fed with third-party controversy data available from providers such as RepRisk. This facilitated enhanced due diligence before entering into a lending relationship particularly where there were breaches of a predefined list of nature-related criteria such as substantial and negative biodiversity impacts, illegal logging, substantial water pollution etc. It also used ENCORE in the Locate stage to identify where its portfolio companies' assets fall within areas of high ground/surface water stress.

Gaps and challenges in the Locate stage

Sourcing geospatial data that is of consistent quality is acknowledged to be difficult. While some companies may be willing and able to provide accurate geospatial data for their operations and supply chain, others may not. Organisations may be reluctant to disclose geospatial data due to the perception of it as commercially sensitive data or concern that this disclosure could lead to security/reputational risk for assets and sites e.g. targeted by environmental activist groups. In some cases, organisational geospatial data is not explicitly disclosed but may be partially-or fully-inferred from public information available online. These barriers to disclosure remain a challenge for private organisations, and for public organisations where it is not considered in the public interest to disclose geospatial data.

Further, spatial data covering the area of influence is highly preferable to enable high quality evaluation and assessment, including the identification of relevant watersheds, intake streams, effluent sinks, access routes etc. In many cases, sourcing information beyond location of operations is considered a significant challenge for users at present due to various reasons: inconsistency in data quality and availability between geographies; a lack of data platforms that source and maintain spatial data at a watershed scale; and a lack of resources within organisations to develop geospatial analysis and deliver ongoing monitoring and disclosure.

Where exact locations are not available, the location(s) were approximated to the country or regional level using primary data. For supply chains, input-output modelling was used as a high-level approach to estimate the country and sector of suppliers at each tier of the supply chain, with data from providers such as Exiobase. Again, it is noted that input-output modelling is predominantly used for estimating the size and scale of impact, rather than locations, however in absence of location data it can provide a useful starting point that can be updated with primary/secondary data over time. Third party data services could be used to validate or gap fill asset level information for some companies, although it is recognised that all of these 'gap filling' approaches provide limited consistency and accuracy.

Evaluate

SocietyInvest grouped both its investment portfolio and lending portfolio companies by subindustry to identify water related dependency and impact risks using the ENCORE tool. For its food manufacturing exposures, SocietyInvest identified ground and surface water supplies as 'very high' materiality dependencies. Water quality and water flow were identified as 'medium' materiality. Similarly, on the impact side, water use and water pollutants were identified as 'high' materiality.

Where data was available, SocietyInvest collated primary data directly from companies on water consumption and replenishment, to understand the extent of dependency and potential scale of impact. Such information was valuable both for credit risk as well as investment risk analysis.

Gaps and challenges in the Evaluate stage

Higher quality insights on company impacts could theoretically be obtained through broader, primary data collection at the asset, watershed and ecosystem level. These primary data could include water consumption, water chemistry, biodiversity rates, watershed replenishment rate, annual variation in rainfall etc. This is not considered feasible or practical for a user to undertake without substantial effort, where preparers do not provide this data already. As more companies begin to measure and manage their dependencies and impacts, and disclose these, users such as SocietyInvest will be better positioned in primary data availability and quality.

Secondary data may support users to determine relevant nature-related impacts and dependencies. Geospatial AI tools, such as Rezatec's water SAT, could be used by SocietyInvest to explore water quality at various geographic scales. These insights can be used to fill data gaps (or

verify datapoints), add detail to company disclosures or enable aggregation of relevant metrics across geographic regions and portfolios.

Where geospatial data is approximated using country or region level data, the level of certainty of impacts and risk for the user is much more limited. Some tools specifically evaluate the dependence of industries on ecosystem services within a country. Tools such as Swiss Re's CatNet® enables consideration of dependency materiality e.g. using the Biodiversity and Ecosystem Services Index (BES Index) that incorporates data on water security, habitat intactness, water quality, erosion control and coastal protection, among other measures. This is an aggregated, top-down assessment of risk by combining hazard, loss, exposure and company insurance information with selected geographic information (e.g., existing maps or satellite imagery) and produces an indicative (qualitative) risk score. Importantly for users, investments can be aggregated by risk level and expressed as a percentage of the portfolio. Although the insights are limited to qualitative scoring, tools like this provide a pragmatic approach to identifying relevant impacts and dependencies where geospatial data is limited.

Where controversy data flags significant impacts in a company or its supply chain then the credit officers or portfolio managers can seek information from the companies/suppliers to demonstrate that this is sufficiently mitigated e.g. evidence that the company/supplier's operations are not contributing to the controversy or impact, and/or information on how the impact and subsequent risk is being managed and mitigated. Without this information and active effort to manage and mitigate the impact, the incentive for businesses to operate or invest in locations or sectors with 'high controversy' remains low, and the impacts would persist.

There is a risk that controversy data is interpreted as a comprehensive coverage of ESG issues, whereas this data is likely to only cover a subset of issues as reported from the media perspective. Companies should use controversy data only in combination with other impact and dependency identification tools. This issue is exacerbated in regions without good media coverage on ESG controversies, meaning that these regions could appear to have disproportionately low impact and low risk. Therefore, a regional comparison should not be relied upon to provide a comprehensive view of relative impact and risk. Finally, users such as SocietyInvest should consider how to encourage impact management and mitigation in response to controversies.

Assess

SocietyInvest sought to assess its companies' ability to mitigate the risks associated with the impacts and dependencies identified in the Evaluate stage. Starting with its highest risk portfolio companies, SocietyInvest assessed each company's ability to mitigate and navigate their water-risks.

Companies with relevant disclosures were assessed through desktop reviews. This was conducted by SocietyInvest manually, however the company seeks to outsource this assessment to third parties in the future (which could be a bespoke assessment, or procurement of relevant data from a data provider, as new indicators and metrics come to market).

Companies without relevant disclosures may require further engagement to avoid classification as higher risk either from a lending or an investment perspective. For example, SocietyInvest lends to a food manufacturing business, known as Bev4U. Bev4U's operations are situated in a water scarce region. SocietyInvest assessed Bev4U's disclosures but required further information that Bev4U was addressing and mitigating their physical risks and transition risks, such as regulatory risks and reputational risks:

- Physical risks: Bev4U provided SocietyInvest with primary data including its operations water footprint against total watershed demand, government approved water management plans, certifications and proof of formal cooperation with other watershed users to monitor water demand and ensure source replenishment.
- Regulatory risks: Bev4U provided evidence of monitoring the risk of increased water regulation by authorities, including an increase or introduction of water-taxes, through regular government engagement in areas of operation.
- Reputational risks: Bev4U provided evidence of assessing water supply and the demand from other water users, and active engagement with the local community on water scarcity and quality issues.

SocietyInvest was satisfied that although Bev4U is located in a high-water stressed region, with projections suggesting that the region will continue to be water-stressed in the future, that it evidenced sufficient risk mitigation regarding water dependency and impact risks. SocietyInvest required commitment from Bev4U for ongoing engagement and monitoring of ESG issues and risk management as part of the conditions of its lending commitment.

Gaps and challenges in the Assess stage

Nature-related risks can extend down the supply chain beyond visibility of a disclosure user like SocietyInvest. Where accurate geolocation data and supporting primary data are not available, these risks may sit in the supply chain and remain unseen/unchallenged. Users should encourage and support preparers to disclose information on their suppliers and engage with them on nature-related risk and mitigation efforts.

SocietyInvest may rely on issue-specific or industry certifications (e.g. International Water Stewardship Standard (AWS v2.0) certification for water-related activities) as an additional level of assurance for mitigation action. Similarly, aggregations of data from across relevant certifications can build a view of the portfolio risk and opportunities. This presents a problem in some regions and industries in which certifications or relevant, internationally recognized guidelines may not exist, precluding this as an option. Additionally, the certifications that do exist may not in all cases represent industry best practice, may be corrupt or may be unattainable to companies for other reasons. On this basis, users should not rely on third-party certifications to provide a comprehensive and comparable view across preparers/portfolio companies, but instead should consider them as only one of multiple sources of information on mitigation action.

In seeking evidence from preparers on risk mitigation, SocietyInvest may look in disclosures for defined action plans on how the company intends to reach targets such as 'nature-positive',

including mitigating water impacts and dependencies. It is acknowledged that preparers may not include detailed action plans within disclosures, nor other external publications. Without a substantial equity holding or some form of operational/financial control, users may find this information difficult to obtain, and active engagement with the preparer may be very limited. In these cases, users could work together to encourage portfolio companies to engage in – and disclose on – nature-related risk and opportunity.

Prepare

SocietyInvest used the data and assessments provided by Bev4U and other companies to categorise and assess the risk profile of their exposures. SocietyInvest decided on material/ relevant risks to manage at a portfolio level and report on to stakeholders.

Alignment of preparer disclosures enabled SocietyInvest to leverage consistency in the insights and analysis, and allowed for some comparisons between similar companies, providing decisions-critical information in some cases. SocietyInvest also prepared its mitigation plan, for the risks and opportunities identified. This included the identification of KPIs, and consideration of how these will be monitored to show progress and risk mitigation over time.

- The company first considered tracking the proportion of its lending portfolio companies (operational assets and known supplier assets) that fall within biodiversity hotspots, UNESCO biospheres, RAMSAR wetlands and other areas of high ecological value. The proportion within these areas was considered to ideally decrease over time (to zero, eventually), to minimise the potential impact on nature and reputational risk to SocietyInvest as the investor. It proposed to use GIS shape data of these areas of interest (e.g. accessed through tools such as IBAT ‘site of biodiversity importance’ and the UNESCO World Heritage geospatial data tool), overlayed with portfolio company operational and supplier asset locations, where known, to monitor this on a bi-annual basis. As part of this, it also looked to monitor its extent of geospatial data that is sourced from portfolio companies and their suppliers, rather than third-party/gap-filling approaches. This should increase over time as primary data improves.
- SocietyInvest also considered monitoring the state of freshwater ecosystems in the countries where its lending portfolio companies operate. It proposed to use the Freshwater Ecosystems Explorer tool to monitor the state of reservoirs and water quality in these countries, on an annual basis, at a country level. Where declining ecosystems are observed over a period of 3 years, increased granularity of monitoring can be put in place and mitigation plans developed/ revised with the portfolio companies. The timeframe of 3 years was determined with subject matter experts that SocietyInvest engaged with as part of its disclosure process, but each user/ preparer company should consider its own timeframes based on its own circumstances.
- Finally with respect to its investment portfolios, SocietyInvest also considered how it can start to reduce the impact of its portfolio investments on water-related ecosystems. The baseline water footprint was estimated using primary data where available (like Bev4U that reported this data to SocietyInvest, above). Where water footprint data was not available, SocietyInvest estimated this for each portfolio company using multi-regional input-output

data. Over time, the company will track the proportion of investments reporting primary water footprint data, with the aim to increase this proportion of primary data over time and therefore increase accuracy. SocietyInvest may use its holdings in such companies to encourage further disclosures. This would also enable SocietyInvest to track the progress of portfolio companies on reducing water footprint (to the extent where reduced consumption is feasible; it also proposed to track water use relative to revenue, to monitor water footprint intensity over time). The company intends to make use of this enhanced water footprint data over time to better understand the effect of mitigation actions taken by portfolio companies, and in return assess its own risk as the investor.

Summary of gaps and challenges identified by SocietyInvest

Several key gaps and challenges remain for SocietyInvest in truly understanding their risk and optimising their lending and investment portfolio exposures to nature-related risks:

- Lack of location-specific information for companies. Banks and investment firms tend to hold extensive instrument and ownership data models, but few / none hold asset location data;
- Lack of data that allows understanding of trends over time and predictions of nature-related impacts and dependencies into the future;
- Many questions related to methodology and exposure to specific data sources exist, lowering the confidence in the data and assessments provided by portfolio companies
- Some of the species most at risk are not studied widely and not included;
- Lack of quantification of the financial value of the risks / potential opportunities sensitive to nature-related risk for each portfolio company;
- No commonly agreed-upon portfolio level metrics that represent an overall nature-related impact (e.g., nature positive etc.); and,
- Given that impacts on nature are complex and multi-layered, the portfolio level reporting may need to happen at the sector, biome or other level. Users are likely to define different priority metrics to meet their goals for rigour and aggregation, which is likely to lead to initial lack of comparability across users, and a confusing set of expectations for issuers.
- SocietyInvest identified that preparers may also disclose to water-specific frameworks e.g. CDP or Climate Disclosures Standard Board Water Guidance. While potentially useful, this reporting was not consistent across portfolio companies and may require manual consideration on a case-by-case basis when assessing investments.

5. Key insights & observations

5.1. Data coverage differs across nature categories

Most tools and platforms do not have exhaustive data, which can result in bias towards most-studied aspects and limit comparisons between regions. In particular, biodiversity data tends to be skewed taxonomically and/or geographically. Some taxa or biomes have greater coverage than others. For example:

- There are more data for terrestrial biomes than for marine or freshwater;
- There are more data on vertebrates (especially large mammals and birds), forests, protected areas, fisheries and data linked to climate change (greenhouse gas emissions, sea temperature) than other categories of nature; and,
- There is also variance within these areas of greater coverage. For example, data in the birds taxa are more heavily weighted toward Europe and North America.

5.2. Variance in measurement approach

It is important to define the specific nature-related focus of a particular measurement approach. Biodiversity is a complex, multi-level concept so different approaches to measurement are reliant on proxies specific to set objectives and data availability. Similarly, what constitutes ecosystem health will vary by geography and context. Finally, some impact models do not account for all potential environmental drivers impacting nature and biodiversity. For example, increases in rainfall, continental runoff and atmospheric dust deposition are reducing water transparency in lakes worldwide but these drivers will differ from lake to lake, year to year and modelling of their impact will vary from region to region. Without standardisation, there is a risk that differences in focus employed by different approaches without qualification may lead to risk assessments of ostensibly similar companies having very different results. However, spatial analysis technologies and information standards are enabling flexible interrogation at source with predictions visually represented at appropriate resolutions. Open geospatial data standards and application programming interfaces (APIs) are essential to this vision of interoperability. A recent paper by WWF, Geospatial ESG^{xiv}, sets out the emerging application of geospatial data.

5.3. Spatial and/or temporal biases in data

Knowledge derived from site-based observations and collections is biased according to the data source, location, and time period of collection. However, the source and nature of biases are not always explicit from the data. Similarly, there is a common absence of methodological detail or metadata describing how particular data trends over time and space are calculated. Temporal variation in biodiversity data is commonplace (in some case unavoidable due to natural variations in ecological systems) but how it is dealt with in methodologies, platforms and tools is often unclear. Integrating data from different sources can provide insights not possible to get from any one source and may overcome some of the aforementioned weaknesses of each type of data, however the lack of transparency or standardisation is exacerbated by an explosion in nature-related data service providers. Many organisations and companies are acting independently to develop their own databases and corresponding platforms and tools using inaccessible methodologies, which in some instances are not peer-reviewed but classified commercially as protected intellectual property.

Finally, there is a lack of scope to track trends over time in quantifiable ways – assessing, disclosing and reporting on risks and opportunities will require access not only to nature-related data, but also to regional and sectoral data on the location of activities, associated pressures exerted on nature, as well as the actions taken to address these risks.

5.4. Access and relevance are limited

Nature-related asset location data is essential for the calculation of decision-useful data. Having access to the spatial locations of company assets, operating areas, and suppliers is necessary although levels of granularity will depend on sector, geography and regulatory framework. Ultimately, models are only as good as their data and relevance, but collecting spatially-explicit information for the entire value chain of companies will be both challenging and time-consuming for companies. Furthermore, there is potential for end-user misalignment in that what is important for a company in assessing and disclosing nature-related risks may differ from what a financial institution assesses as material.



6. Key issues for discussion & development

6.1. Centralising nature-related data platforms

An open question on which we would welcome feedback from market participants is whether the TNFD should look to support the development of a decentralised but standardised nature-related data portal. Information silos constrain integrative networks and deep insights. Furthermore, having diverse data realms which do not interact easily with each other impedes the ability of companies and financial institutions to engage with confidence. Creating a way to effectively use these data requires a uniformed integration of disconnected datasets.

Furthermore, being able to verify company sourced data with reliable alternative sources will help in building robustness through validation. There has been significant research done already in this area, for example, by UNEP Finance Initiative (UNEP-FI), UNEP World Conservation Monitoring Centre (UNEP WCMC) and the Finance4Biodiversity Initiative. However, there remains a need to clarify the types of data available and the various interlinkages. Standardisation should draw heavily on existing work in a collaborative approach.

6.2. Moving beyond ESG data

Today's mainstream ESG data practices are in the main defined by company questionnaires and web-scraping of large amounts of unstructured and self-disclosed data. Understanding nature-related risks and opportunities will require inclusion of data harvested from the real economy via observations of company behaviours and/or self-reported data at the asset level. The data foundation needs to be available for adoption of such multi-data layer approaches by financial institutions. There will also need to be greater integration of historic data and forward-looking modelled data.

6.3. Innovations in data

From automation to traceability and remote sensing to eDNA sampling, improving computable data holds the promise to help businesses better understand baseline values, and predict, mitigate and monitor nature-related risks. Such developments will see gains in efficiencies by

greatly reducing the amount of time necessary to gather nature-related data and perform impact and dependency analysis, enabling users of the TNFD framework to respond to nature-related risks and opportunities in a much more meaningful time frame.

There has been an explosion in growth of data product offerings with significant technical developments improving computable data e.g. mobile surveys, fixed place surveys, remote sensing, blockchain, data processing etc. Development in geospatial analysis which are asset and sector-specific sits at the heart of this technological emergent trend. The speed of development and increased demand is to be applauded. However, greater transparency of process and methodology should be addressed in tandem. Regardless of the type of data that is being used to assess nature-related risks, data use and methodological decisions should be fully transparent (including peer-review) to allow for a traceable and replicable assessment. Collaborations between agencies and commercial entities like IBAT, some commercial providers are to be applauded and will hopefully strengthen accessibility and relevance of nature-related data for companies.

6.4. Technical challenges to data access

Undoubtedly tools and data are improving rapidly and will in all likelihood be better in even 12-18 months from now. But near-term, there are technical challenges to data access which need addressing. Some emerging tools are not readily available to non-technical users, thereby limiting access e.g. mean species abundance (MSA) indicator.^{xv} There is also an added complication for non-technical users trying to combine data in derivative products for measuring and reporting. Typically, datasets are in the form of shapefiles, GeoTIFF, KML, Web Feature Services, or other GIS file formats which are difficult to translate uniformly without advanced technical knowledge. Continuing product development in a collaborative way will be key and funding initiatives like a marine version of the Species Threat Abatement and Recovery (STAR) metric, will address these shortcomings and accelerate end-user engagement.

6.5. Technical expertise, resource and capacity on nature-related data

Greater technical expertise, resource and capacity is needed in companies and financial institutions to enable effective engagement with nature-related data. The pattern of ESG engagement in general has seen a mismatch between demand to engage with the number of professionals with appropriate experience capable of engaging effectively. An HSBC survey in 2021 found that 37% of investors cite a shortage of expertise or qualified staff as the principal obstacle when it comes to pursuing ESG engagement – up 30% from last year.

6.6. Primary data collection and analysis

Stakeholders should be collecting primary data to monitor dependencies and impacts. Ideally this data could then feed (in an anonymised format) into a standardised aggregated data set. Systems for third-party biodiversity footprinting based on public data about companies are still basic and hard to interpret correctly. This is mainly because they largely do not take account of the place-specificity of biodiversity which may well be misleading if not carefully interpreted. The diffusion of microplastics, pesticides and fertilizers are cases in point. But at this stage, reporting on impact drivers or pressures (e.g. land use, water use etc) and responses (e.g. SMART targets, mainstreamed governance) is likely to be more reliable.

6.7. Integration across data platforms and tools

The assessment also identified a need for greater understanding and onward discussion on data interaction. Many of the platforms or tools currently available have a particular specificity and lack the flexibility to be integrated into other solutions. Variances in temporal consistency across data also hinders integration and the ability to cross-reference effectively. Furthermore, data requirements will differ depending on the entry points of engagement. For example, a company may use ex post analysis in locating and evaluating their current interactions with nature and where their impacts and dependencies lie. However, in assessing future risks and opportunities they will rely on forward looking ex ante analysis. It is therefore important to understand the capabilities and limitations of currently available data and being explicit about the use of proxies.



7. Annex 1: Characteristics of Decision-useful Data

Decision-useful criterion	Definition in the TNFD Proposed Technical Scope
Relevance	Formal recognition as appropriate to the decision context – e.g. as part of the monitoring frameworks of multilateral environmental agreements or national policies – including the mechanism of recognition and the role of third parties in formal recognition of specific datasets.
Resolution and scalability (spatial + non-spatial)	Fit for use at the right scale for the decision. A balance may be struck between the resolution and the complexity of processing the data. For example, sourcing may not be better informed by <1km resolution geospatial data, where sub-regional data may be easier and more straightforward to process.
Temporality	Time series data can support trend analyses or real-time decision-making but must reflect the appropriate time scales for the indicator of interest (including forward looking analysis where relevant), but also the feasibility of collecting data using current or emerging technologies and collection techniques (e.g. species abundance).
Frequency of update	Regularly updated or updated at appropriate timescales for the subject matter – real-time vs periodic (hourly, daily, annually etc) or triggered and event driven.
Geographic coverage	Globally consistent and comprehensive. Data should be collected in a fashion and using metrics that permit aggregation and disaggregation to allow for attribution e.g. across portfolios, corporate footprints etc.

Accessibility	Decision-grade data must be easily accessible online in different formats (e.g. direct downloads, web services, APIs), including considerations of costs were not open and freely accessible, as well as available in multiple languages.
Comparability	Decision-grade data must facilitate comparison through interoperable formats and consistent methods that enable integration of financial, socio-economic and ecological data across sectors to inform outcomes. Data should be comparable across and within industries.
Thematic coverage	Addressing specific components of nature (encompassing species, ecosystems and contributions to people), pressures on nature (point and non-point source, direct and indirect) and responses (private, government, societal).
Authoritativeness including providence	If data have been through a peer-review process, whether published in the scientific literature, reviewed by peers, or a mandated process (e.g. CBD), and are recognised as accurate and authoritative. In order to assess authoritativeness, the data must also be traceable. Data is traceable if the original data source is clear as well as the “data trail” which lays out how the data has been translated by different users to arrive in its final format. Ideally, TNFD-aligned reporting would be audited by a third party to verify its authoritativeness.



8. Annex 2: Reference Material

A number of internal databases and proprietary inventories from TNFD knowledge Partners were referenced with thanks but are unavailable for onward sharing.

Biodiversity analysis in the digital era

royalsocietypublishing.org/doi/pdf/10.1098/rstb.2015.0337

Geospatial ESG

fint.awsassets.panda.org/downloads/geospatial_esg_report.pdf

Paving the way towards a harmonised biodiversity accounting approach for the financial sector

pbafglobal.com/files/downloads/PBAF_commongroundpaper2020.pdf

Disclosing Nature's Potential

portals.iucn.org/library/sites/library/files/documents/2021-038-En.pdf

Biodiversity - The Ecosystem at the Heart of Business

Biodiversity - CitiGPS (citivelocity.com)

Essential biodiversity variables for mapping and monitoring species populations

Essential biodiversity variables for mapping and monitoring species populations | Nature Ecology & Evolution

UN System of Environmental-Economic Accounting – Ecosystem Accounting

seea.un.org/content/system-environmental-economic-accounting-ecosystem-accounting-white-cover-version

Is biodiversity a material risk for companies?

businessandbiodiversity.org/pdf/FC%20Biodiversity%20Report%20FINAL.pdf

Reporting on Nature-related Risks, Impacts and Dependencies

g20sfwg.org/wp-content/uploads/2021/08/2021-UNEP-UNDP.-Reporting-on-Nature-related-Risks-Impacts-Dependencies.pdf

A list of spatial available data

Available spatial data - Google Sheets

Biodiversity Platforms for Implementing a Sustainable World

gbif.org/

Workshop Report A synthesis of available scientific input to inform the development of the post-2020 global biodiversity framework

unep-wcmc.org/system/comfy/cms/files/files/000/001/585/original/Synthesis_of_Cambridge_Meeting_on_Scientific_Input_to_the_Post_2020_Global_Biodiversity_Framework.pdf

Natural Capital Protocol

capitalscoalition.org/capitals-approach/natural-capital-protocol/?fwp_filter_tabs=training_material

What does 'nature' mean?

nature.com/articles/s41599-020-0390-y

Open-source Biodiversity Data Platform Initiative (unpublished paper by UNEP WCMC and Finance for Biodiversity)

An inventory of biodiversity data sources for conservation monitoring

journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0242923&type=printable

TNFD proposed Technical Scope

tnfd.global/wp-content/uploads/2021/07/TNFD-%E2%80%93-Technical-Scope-3.pdf

Data integration enables global biodiversity synthesis

www.pnas.org/content/118/6/e2018093118



8. End notes

- i.** gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review
- ii.** [wwf.org.uk/sites/default/files/2022-01/Geospatial_ESG_Report.pdf](https://wwwf.org.uk/sites/default/files/2022-01/Geospatial_ESG_Report.pdf)
- iii.** gistimpact.com/
- iv.** encore.naturalcapital.finance/en/
- v.** surfaceintelligence.com/product
- vi.** ibat-alliance.org/
- vii.** globalforestwatch.org/
- viii.** planet.com/products/
- ix.** ghgsat.com/en/
- x.** grundo.io/
- xi.** naturemetrics.co.uk/
- xii.** sylvera.com/
- xiii.** gistimpact.com/
- xiv.** wwf-sight.org/geospatial-esg/
- xv.** globio.info/what-is-globio



Taskforce on Nature-related
Financial Disclosures



自然との接点の分析に活用できるツールの紹介

自然関連財務情報開示のためのワークショップ《ベーシック編》

第1回 自然との接点の分析に活用できるツールの紹介・実践

2023年09月15日

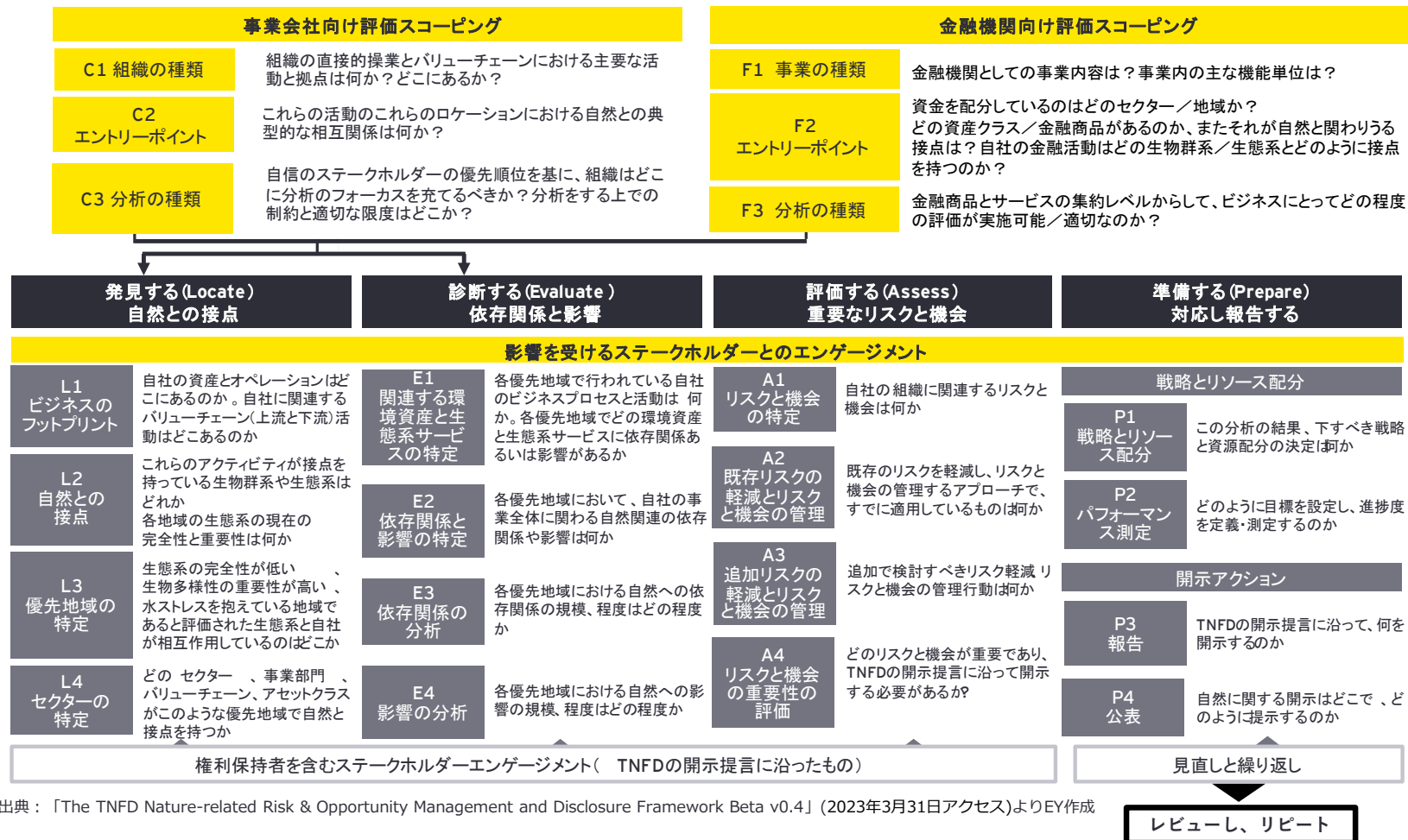


1. TNFD紹介ツール
2. 自然との接点の分析ツール
3. ツールを使用した分析結果の開示例

1 TNFD紹介ツール

再掲：TNFD：LEAPアプローチ

- ▶ 情報開示に向けた分析手法として、LEAPアプローチが推奨されている
- ▶ 4つのステップと、企業(C)または金融機関(F)が対応するスコーピングを含む19の質問項目により構成



出典：「The TNFD Nature-related Risk & Opportunity Management and Disclosure Framework Beta v0.4」(2023年3月31日アクセス)よりEY作成

1 TNFD紹介ツール TNFDウェブサイト「Tools Catalogue」では、ツール 紹介が常時更新され、ツールの概要が説明されている。

TNFD HP Tools Catalogue (2023/8/4アクセス時点)	Locate [※]				Evaluate			Assess				Prepare			
	L1	L2	L3	L4	E1	E2	E3/4	A1	A2	A3	A4	P1	P2	P3	P4
ツール数	10	49	38	13	50	57	64	40	8	22	24	20	23	13	9

※TNFDにおける自然との接点を見るフェーズ

Tools Catalogue

Logged in users can personalise Framework guidance and recommendations by setting user preferences. Please consider [logging in](#) or [creating an account](#) to customise your preferences.

Building on insights from the Nature-related Data Catalyst, the TNFD has created a beta version of an online searchable Tools Catalogue that provides an overview of tools that organisations can use to apply each phase of the LEAP approach. The Catalogue will continue to be updated over time.

[Add a tool to the catalogue](#)

Search Criteria

LEAP phase
L3: Prioritisation according to the integrity and importance of re...

Filter results
☒ Show me everything
☐ Show me content related to my preferences
[Update your preferences](#)

[Update Results](#)

SEED (WORK IN PROGRESS)

SEED is currently being pilot-tested before a v1 release in September, at which point it will be hosted open access on Restor together with many of our interactive maps (which are already included in the Tools Catalogue). Together, Restor and SEED...

[Visit platform](#) [Find Out More](#)

Restor (WORK IN PROGRESS)

Restor is a platform that gives open access to a huge number of global ecological datasets through a user-friendly interface. Together, Restor and SEED will make it easy for companies to create 'joinpoints'...

[Visit platform](#) [Find Out More](#)

Global Biodiversity Information Facility (GIB)

GIB—the Global Biodiversity Information Facility—is an international network and data infrastructure founded on a 1999 OECD recommendation and funded by the world's governments...

[Visit platform](#) [Find Out More](#)

IBAT (WORK IN PROGRESS)

Geospatial data to identify where operations/supplier locations sit in areas of interest such as Key Biodiversity Areas.

[Visit platform](#) [Find Out More](#)

WRI Aqueduct – Water Risk Atlas (WORK IN PROGRESS)

Identify and evaluate water risks based on geography, including geospatial data of watershed regions that can be overlaid with operations/supplier locations.

[Visit platform](#) [Find Out More](#)

Land Portal Geoportal (WORK IN PROGRESS)

Geospatial data layers on forest tenure, land and corruption, forest landscape restoration and indigenous and community land rights.

[Visit platform](#) [Find Out More](#)

Natural and Mixed World Heritage Sites data (WORK IN PROGRESS)

Geospatial data for UNESCO World Heritage sites that can be overlaid with operations/supplier locations, to screen for sites that sit in these locations.

[Visit platform](#) [Find Out More](#)

Local Biodiversity Intactness Index (LBII) (WORK IN PROGRESS)

The Local Biodiversity Intactness Index provides estimates of human impacts on the intactness of local biodiversity worldwide, and how this may change over time. Because LBII relates to site-level biodiversity, it can be averaged and reported for any larger...

[Visit platform](#) [Find Out More](#)

WWF Biodiversity Risk Filter (WORK IN PROGRESS)

Understand, assess and respond to your biodiversity risks for enhancing resilience

Corporate and public-level screening tool to help companies and investors...

[Visit platform](#) [Find Out More](#)

IBAT LIVE

Geospatial data to identify where operations/supplier locations sit in areas of interest such as Key Biodiversity Areas.

[Provide an update to this tool](#) [Visit platform](#)

This platform can support you with the following phases:

L2: Nature Interface
L3: Prioritisation according to the integrity and importance of relevant ecosystems

This tool is relevant for the following sectors:

Resource Transformation
Aerospace & Defense, Containers & Packaging, Electrical & Electronic Equipment, Industrial Machinery & Goods

Food & Beverage
Alcoholic Beverages, Non-Alcoholic Beverages, Agricultural Products, Meat & Poultry & Dairy, Processed Foods, Food Retailers & Distributors

Transportation
Air Freight & Logistics, Airlines, Auto Parts, Car Rental & Leasing, Rail Transportation, Road Transportation, Cruise Lines

Consumer Goods
Apparel, Accessories & Footwear, Appliance Manufacturing, Building Products & Furnishings, Household & Personal Products, Toys & Sporting Goods, E-commerce, Multiline and Specialty Retailers & Distributors

画像：TNFD Tools Catalogue 画面

引用：TNFD Tools Catalogue https://framework.tnfd.global/tools-platforms/?related_content=881&filterby=all (2023年8月4日アクセス)よりEY作成

1

TNFD紹介ツール

TNFDでは、自然との接点の分析（Locate）に67個（2023/8/4アクセス時点）のツールを紹介している。

- ▶ TNFD Tools Catalogue では、自然との接点の分析（Locate）で活用できるツールとして、以下のツールを紹介している。
- ▶ このうち、インターネット上で確認できるTNFD開示企業では6個のツールが使用されている。
 - [IBAT](#)
 - [ENCORE](#)
 - [Global Forest Watch](#)
 - [WRI Aqueduct - Water Risk Atlas](#)
 - [WWF Water Risk Filter](#)
 - [WWF Biodiversity Risk Filter](#)

J-BMP
Responsible Alternate Fibres: Assessment Methodology
Biodiversity Indicators for Site-based Impacts (BISI) or Biodiversity Indicator for Extractive Companies
WaterWorld
Frontierra
Ocean+
Ocean Data Platform
Ordnance Survey MasterMap
CanopyMapper, CarbonMapper, HabitatMapper
Living Planet Index
Nature index
Emapper
Svarmi
Sustaincraft
invest
Verisk Maplecroft Global Risk Dashboard
Sight
Chloris Geospatial
IUCN Redlist of Ecosystems
SoilGrids

Sight
Chloris Geospatial
Aquascope – Water Data and Insights
ESGSignals® Biodiversity
natcap Map
Criteria 2050.
CARE-TDL (Comprehensive Accounting in Respect of Ecology)
Co\$tingNature
Protected Planet
Species+
GloBio
Trase
Global Biodiversity Information Facility
RepRisk ESG Risk Data
Collect Earth
Bioscope
nSTAR
Biodiversity impact Assessment(BiA)
CDP
SEED
Wilder Sensing
Maps

Restor
Copernicus
Ecolab Water Risk Monetizer
EcoVadis
RBA Country Risk Assessment Tool
SEDEX RADAR Tool
Exiobase
India Water Tool
Global Wetlands geospatial data
Natural and Mixed World Heritage Sites data
Swiss Re's CatNet
Biome geospatial data from National Geographic Tool
Starling satellite imagery
Proforest
Afi
Land Portal Geoportal
MapBiomass
Local Biodiversity Intactness Index
Good Practice Guidance for Mining and Biodiversity

2

自然との接点の分析ツール

企業はそれぞれの拠点で多くのバイオームと関わりを持ち、依存と影響、自然関連リスクは拠点特有である。

- ▶ バイオームとは、熱帯雨林、外洋、砂漠、湖など、降雨量と気温のパターン等に応じて生育する植物の種類によって区別される地理的領域を指す。
- ▶ 企業はそれぞれのビジネス拠点で多くのバイオームと関わりを持つ。
- ▶ 自然に関連する依存と影響、すなわち事業の継続性や収益、企業価値に対するリスクの源泉は、場所特有のものであり、企業の自然関連リスクについてはサプライチェーンの上流まで遡り、原材料採取を行う拠点まで評価する必要があることから、非常に多岐に渡る。
- ▶ したがって、企業の自然関連リスクの特定、評価、緩和、管理にとって、立地が重要であり、ビジネスプロセスと自然（環境資産のストックや生態系サービスの流れ）との接点を考慮することが重要となる。



図：バイオームを含む自然との接点

引用：「[The TNFD Nature-related Risk & Opportunity Management and Disclosure FrameworkBeta v0.1](#)」(2023年8月18日アクセス)にEY加筆

2

自然との接点の分析ツール

自然との接点の分析に使えるツール紹介（IBAT）

- ▶ **概要：** IUCNレッドリスト、保護地域、生物多様性上重要地域（KBA）などのデータベースへのアクセスが可能な地理空間データを提供。そのほか、指定する拠点に対し、種の潜在的リスク評価を行うレポート（STAR）等を提供（ただし、有料プラン）。
- ▶ **TNFDによる活用フェーズ：** L2、L3
- ▶ **何ができるか：**
 - ▶ 住所情報等を入力することで、事業／サプライヤーの拠点周辺の、生物多様性上重要な地域に関する整理された情報を閲覧可能。また、マップ上での閲覧も可能。
 - ▶ 無料版では、指定した拠点から直径50km範囲内の数値情報の提供のみとなるが、優先地域を決定するL2、L3段階は、おおまかな地域情報として整理・評価に有効。
 - ▶ 有料プランでは、以下のレポートの作成が可能。

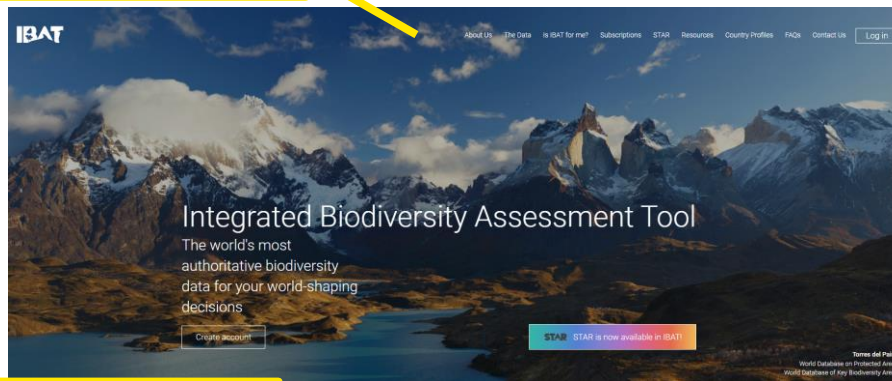
Proximity Report	PS6 & ESS6 Report	Freshwater Report	Multi-site Report	STAR Report
生物多様性リスクスクリーニングを行う初期段階に適しており、保護地域、生物多様性重要地域、IUCNレッドリスト種の詳細がまとめられている。	IFCおよび世界銀行のパフォーマンス基準に合わせた生物多様性リスクスクリーニングを行う初期段階に適しており、保護地域、生物多様性重要地域、IUCNレッドリスト種の詳細がまとめられている。	淡水生態系に影響を与える可能性のあるプロジェクトの生物多様性リスクスクリーニングに適しており、指定した場所の上流および下流における淡水生物種の情報がまとめられている。	GRI等の基準に沿い、生物多様性情報を年次報告書などに組み込む際に適しており、保護地域、生物多様性重要地域、IUCNレッドリスト種の概要が図表でまとめられている。	生物多様性に関する行動の機会の特定と目標設定に適しており、指定する地域に対する脅威軽減スコアと回復度スコアを基に、拠点の種に対する潜在リスクを示している。

- ▶ **利用料：** 一部無料だが、詳細情報やレポートの入手、GISデータDL等是有料となる。

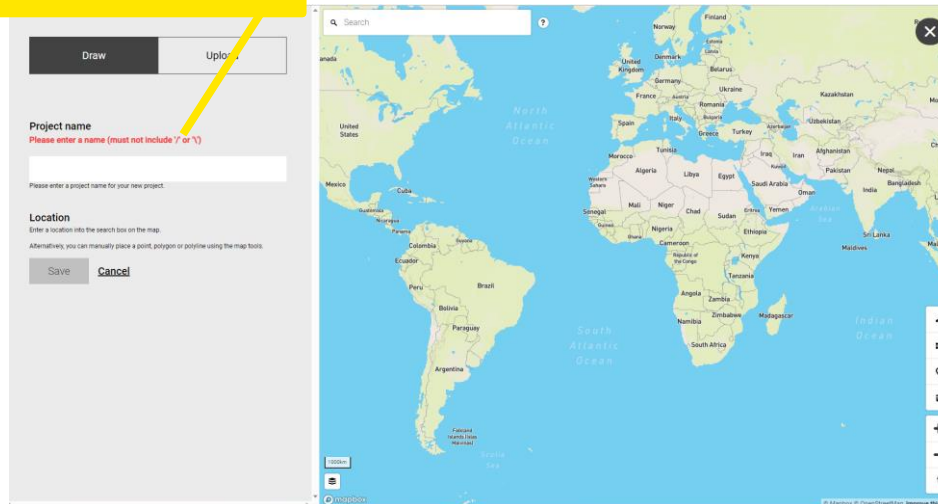
出所：[Integrated Biodiversity Assessment Tool \(IBAT\) \(ibat-alliance.org\)](https://ibat-alliance.org/)

2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (IBAT : イメージ)

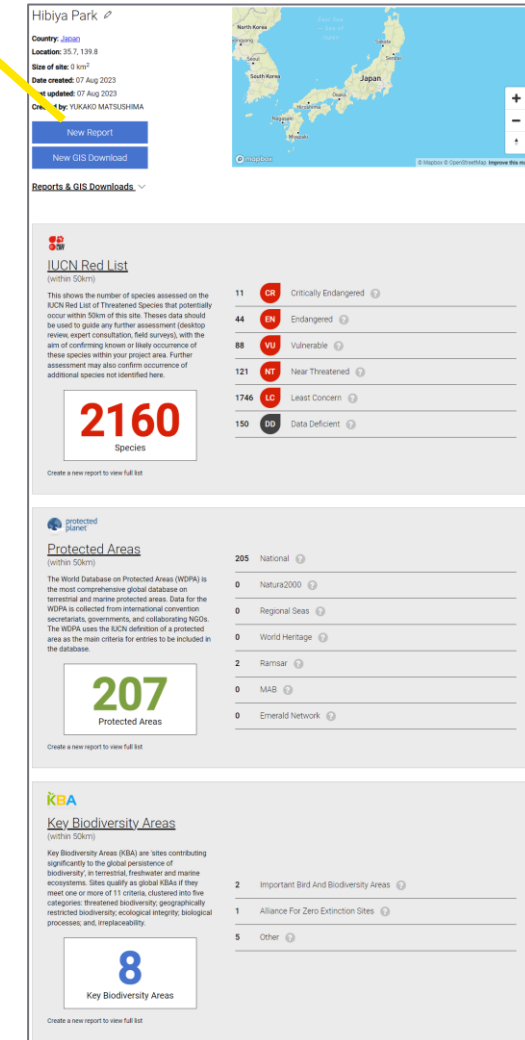
▶ IBATトップページ



▶ 住所入力し、検索



▶ 検索結果



出所 : [Integrated Biodiversity Assessment Tool \(IBAT\) \(ibat-alliance.org\)](https://ibat-alliance.org/)

2

自然との接点の分析ツール

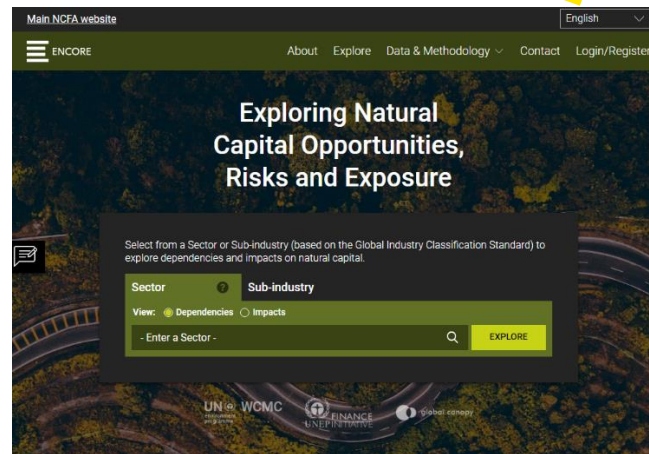
自然との接点の分析に使えるツール紹介（ENCORE）

- ▶ **概要：** 経済が自然にどのように依存しており、影響する可能性があるのか、環境の変化がどのようにビジネスのリスクを生み出すかを可視化するためのツール。金融機関が投融資先企業の自然資本に与える機会やリスクの評価に使うツールであるが、企業が自社の操業地や取引先の原材料調達地について評価するのににも同様に使用可能。
- ▶ **TNFDによる活用フェーズ：** L2、L4、E2、E3、E4
- ▶ **何ができるか：**
 - ▶ セクター、サブセクター、生産プロセスごとに、自然にどのように依存しており、影響を与えているかを特定できる。
 - ▶ サイト上にて調査したいセクター種類を選択することで分析可能。自然資本資産に関するマップ、環境変化の要因、及び影響要因を用いて、セクター固有のリスクを理解することができる。
 - ▶ 特に金融機関は、ENCOREのデータを使用して、高リスク産業およびサブ産業への融資、引受、投資を通じてさらされている自然関連のリスクを特定できるとされている。
 - ▶ リスク管理（潜在的に重要な生態系サービスや自然資本等）、コミュニケーションとステークホルダーエンゲージメント、生物多様性の目標設定とポートフォリオの整合性の整理等に役立つ
- ▶ **利用料：** 無料で使用可能

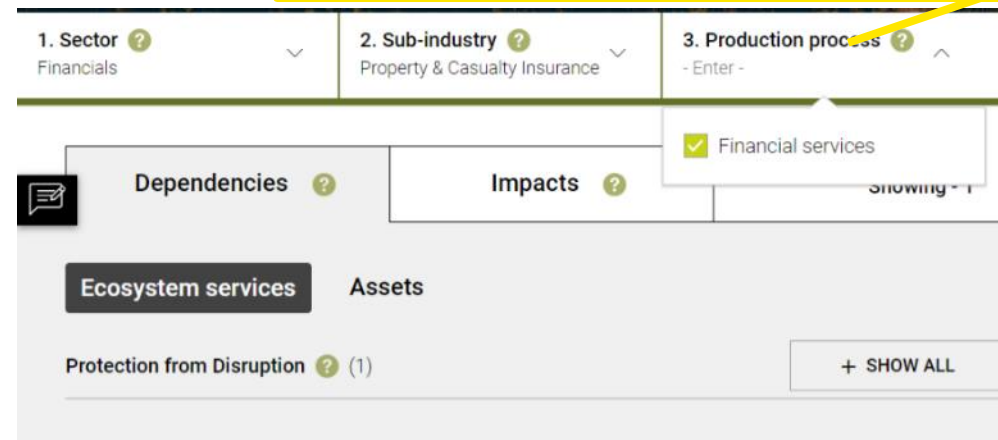
出所：
[ENCORE \(https://encorenature.org/en\)](https://encorenature.org/en)

2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (ENCORE : イメージ)

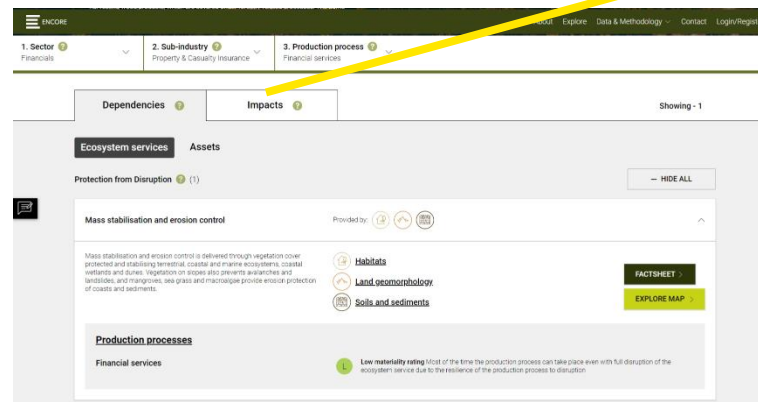
▶ ENCOREトップページ



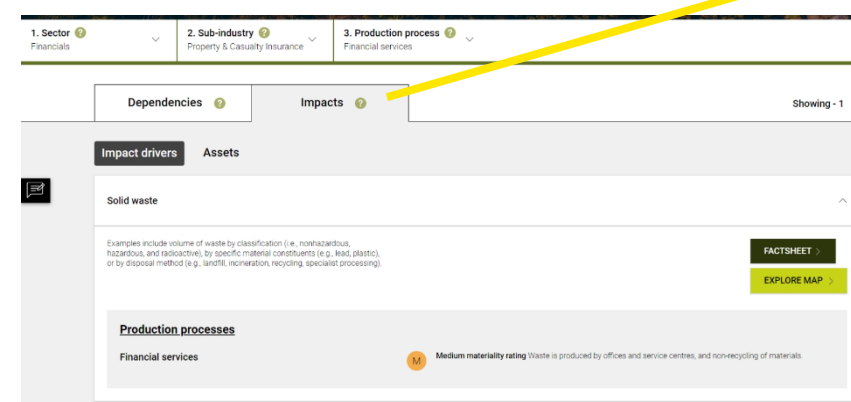
▶ 「Sector」「Sub-Industry」「Production process」を入力し、検索



▶ 「Dependencies (依存)」において、「Ecosystem Services」と「Assets (資産)」の側面に関する評価結果が表示される。



▶ 「Impacts (影響)」において、「Impact Drivers (影響の要因)」と「Assets (資産)」の側面に関する評価結果が表示される。



出所 : ENCORE (<https://encorenature.org/en>)

2

自然との接点の分析ツール

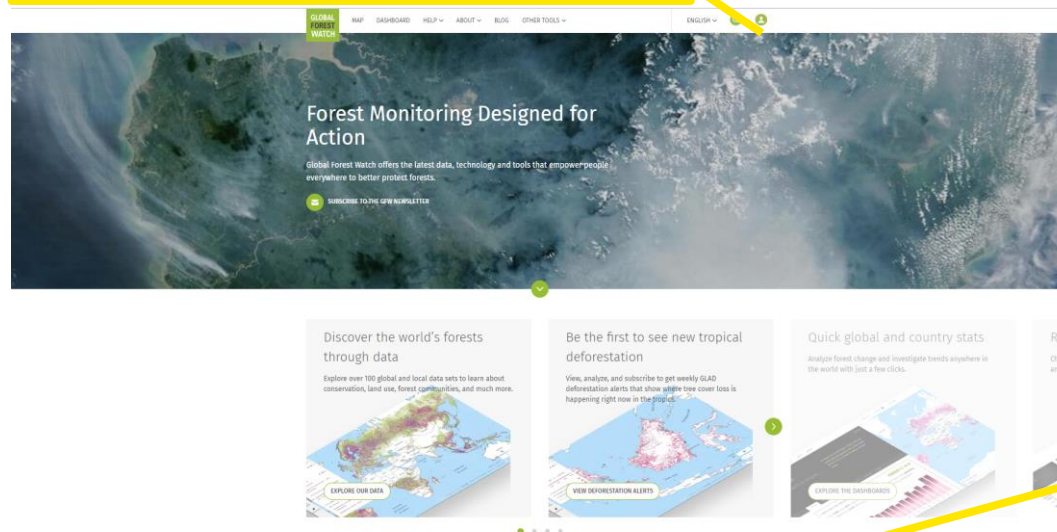
自然との接点の分析に使えるツール紹介 (Global Forest Watch)

- ▶ **概要**：世界の森林破壊を監視するためのデータを可視化（マップ化）し、提供するオンラインプラットフォーム。
- ▶ **TNFDによる活用フェーズ**：E2 、（L2、L3）
 - ※L2、L3は活用フェーズに含まれないが、優先地域を特定する上で重要な情報と考える
- ▶ **何ができるか**：
 - ▶ 森林のモニタリングが可能。森林の変化がどこでどのように起こっているかについて、リアルタイムの情報を提供し、世界中の森林の状況を把握することができる。
 - ▶ 森林の変化（森林伐採アラート、火災アラート等）、土地被覆（原生林、植林地）、土地利用（鉱業権、パーム油工場、保護地域、ダム等）、気候（森林炭素除去、樹木バイオマス密度等）、生物多様性（森林の変化が生物多様性に与える影響、生物多様性ホットスポット等）などに関する様々な情報をマップ上で確認することができる（種類によりデータの粒度が異なる点、地域ごとのデータの有無は留意が必要）。
 - ▶ 項目によっては年ごとのデータが存在し、その地点での時間軸推移も確認することができる。
- ▶ **利用料**：無料で使用可能

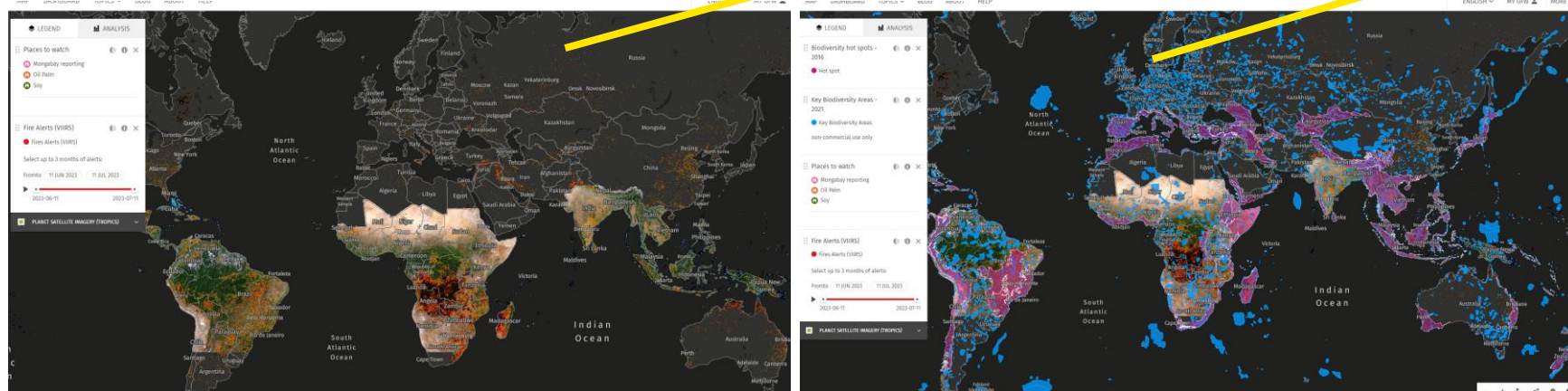
出所：[Global Forest Watch Websit \(https://www.globalforestwatch.org/\)](https://www.globalforestwatch.org/)

2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (Global Forest Watch : イメージ)

▶ Global Forest Watch トップページ



▶ マップ上で視覚的に各地域の自然の状態を確認可能



出所 : Global Forest Watch Website (<https://www.globalforestwatch.org/>)

2

自然との接点の分析ツール

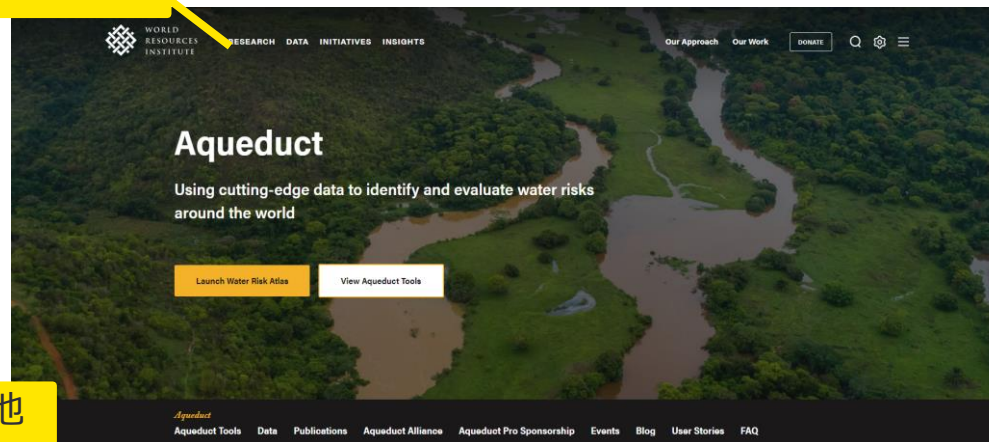
自然との接点の分析に使えるツール紹介 (Aqueduct - Water Risk Atlas)

- ▶ **概要**：世界の地域毎の水リスクを、物理（量・質）・規制・評判の各リスクの観点から評価。HP上でビジュアルデータとして公開。
- ▶ **TNFDによる活用フェーズ**：L3、E3、P2
- ▶ **何ができるか**：
 - ▶ 地域や指標を自由に指定して、地域ごとの水リスクを検索・確認することができる。
 - ▶ 水リスクは、下記の各リスクの観点からマッピングされている。
 - ① 物理リスク（量）：水ストレス、水の枯渇、経年変動、季節変動、地下水位の低下、河川洪水リスク、沿岸洪水リスク、干ばつリスク
 - ② 物理リスク（質）：未処理廃水、海岸富栄養化の可能性
 - ③ 規制・評判リスク：飲料水、衛生設備、国別ESGリスク指数
 - ▶ 事業における重要度や関連性によって各指標のウェイト（重みづけ）をカスタマイズすることが可能であり、各企業はニーズに合わせて水リスクを視覚的に確認することができる。
 - ▶ 各指標（水ストレス、水の枯渇等）ごとに時間軸（2030、2050、2080）、シナリオ（悲観的、通常通り、楽観的）ごとでの各地域の状態も確認できる。
- ▶ **利用料**：無料で使用可能

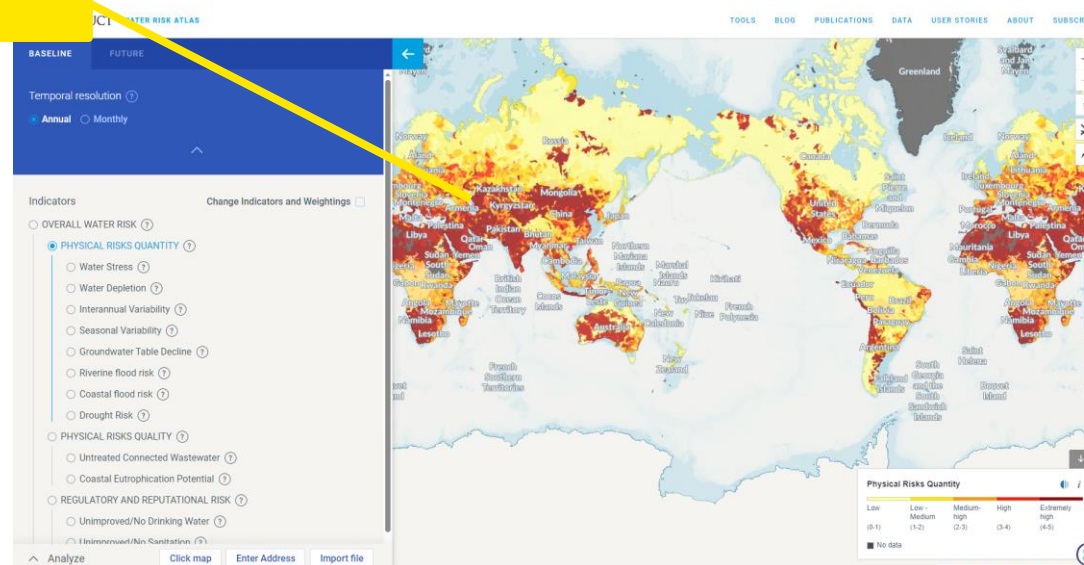
出所：[Aqueduct Water Risk Atlas \(https://www.wri.org/aqueduct\)](https://www.wri.org/aqueduct)

2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (Aqeduct - Water Risk Atlas : イメージ)

▶ WRI Aqueductトップページ



▶ 各水リスクについて、地図上にマッピング



出所 : [Aqueduct Water Risk Atlas \(https://www.wri.org/aqueduct\)](https://www.wri.org/aqueduct)

2

自然との接点の分析ツール

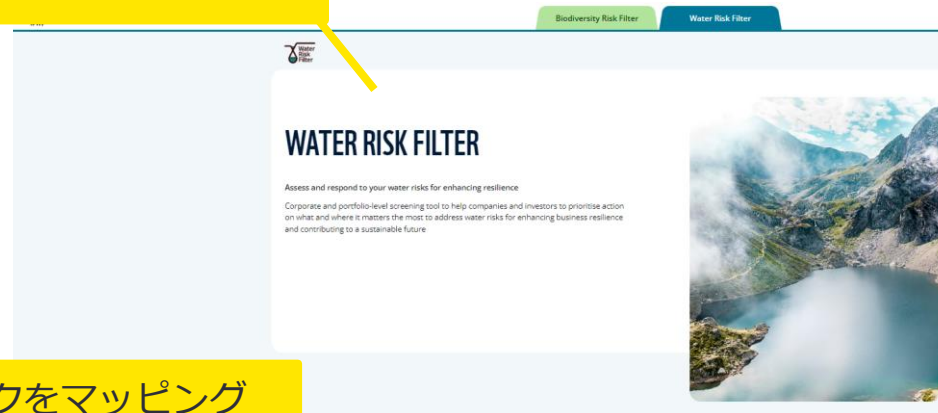
自然との接点の分析に使えるツール紹介 (WWF Water Risk Filter)

- ▶ **概要**：世界の地域毎、サプライチェーン段階毎の水リスクを特定し、水に対する企業の行動に優先順位を付けるための企業およびポートフォリオレベルのスクリーニングツール。
- ▶ **TNFDによる活用フェーズ**： L2、L3、L4、E1、E2、E3、A1、A4、P1、P2、P3
- ▶ **何ができるか**：
 - ▶ Explore（調査）：現在から未来の時間軸で、水に関する物理的リスク、規制リスク、風評リスクを特定できる。マップレイヤー、国別プロファイル、シナリオごとの2030年から2050年までの水リスクの変化、データ（最新のWWF出版物等）の探索が可能。
 - ▶ Assess（評価）：事業、サプライチェーン、投資全体の水リスクを評価できる。
 - ▶ Respond（対応）：水リスクに対処するための企業レベルの推奨事項を提供（2023/8/29現在開発中）
- ▶ **利用料**：無料で使用可能（Assessはユーザー登録が必要）

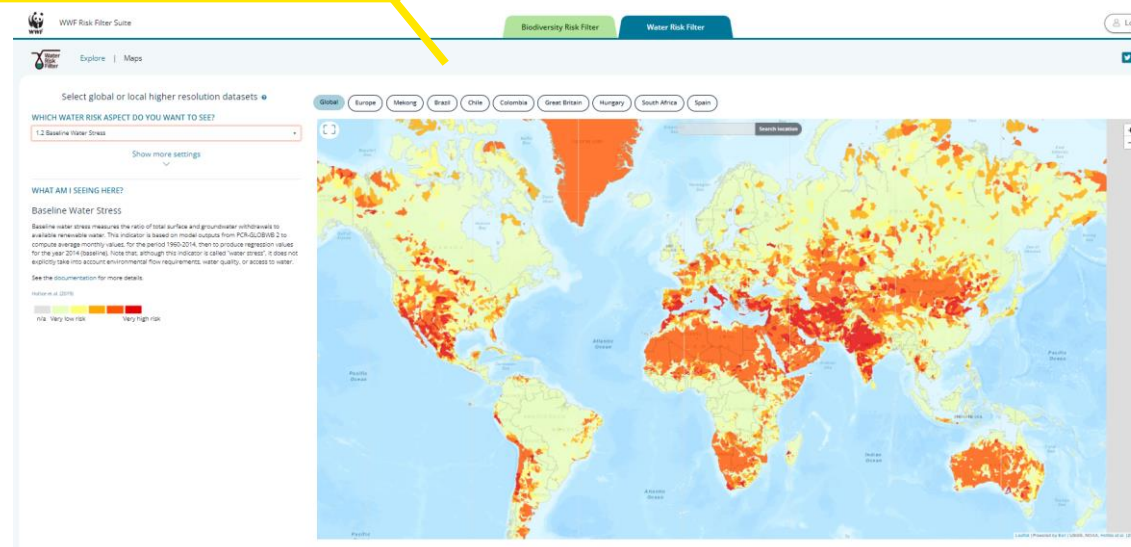
出所：[WWF Water Risk Filter](https://riskfilter.org/water/home) (https://riskfilter.org/water/home)

2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (WWF Water Risk Filter : イメージ)

▶ WWF Water Risk Filter トップページ



▶ Mapsで各地域の水リスクをマッピング



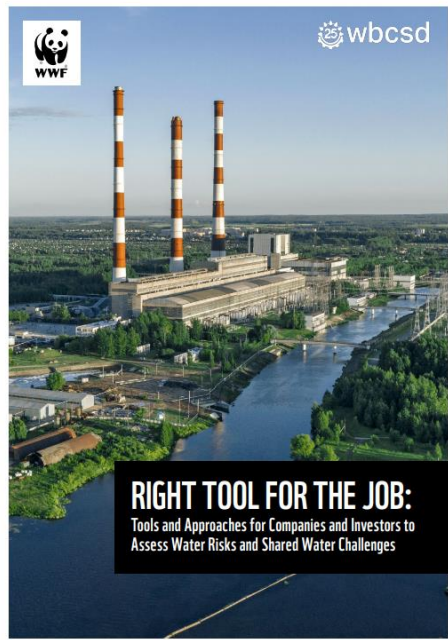
出所 : [WWF Water Risk Filter](https://riskfilter.org/water/home) (<https://riskfilter.org/water/home>)

2

自然との接点の分析ツール

補足：AqueductはFoodと洪水リスクが解析でき、WWF Water Risk Filterは水リスク低減のアクション等も分析可能である。目的によって使い分けることを推奨する。

- ▶ 企業が自社の水リスクを評価するためのツールは数多く公開されている。これらのツールは、水に関する様々な側面を評価できる一方、それぞれのツールの違いが分からず、自社のリスクを適切に評価するためにどのツールを選べばよいかわかりにくいといった声から、WWFから3つの水リスク評価ツールを比較する共同レポート（RIGHT TOOL FOR THE JOB）が発行されている。



出所：

[right tool for the job 1.pdf](https://www.fint.awsassets.panda.org/downloads/right_tool_for_the_job_1.pdf)
https://www.fint.awsassets.panda.org/downloads/right_tool_for_the_job_1.pdf

	Tool WRI Aqueduct	WWF Water Risk Filter	WBCSD India Water（参考）
課題・リスク	水リスク	水リスク	水に関する課題
対象地域	世界	世界・国ごと	国ごと（インドのみ）
河川の水リスクの評価項目	物理的リスク、規制リスク、風評リスク	物理的リスク、規制リスク、風評リスク	物理的リスク
評価と対応	評価	評価と対応	評価
流域水情報の空間解像度	HydroSHEDS HydroBASINS Lv.6	HydroSHEDS HydroBASINS Lv.7 （グローバルデータ） HydroBASINS Lv.12 （国・地域ごとのデータ）	1:250,000 scale
データ更新頻度	2年ごと	毎年	2年ごと
ログイン	不要	一部機能で必要	不要
ツールごとの違い	食料安全保障と農業及び世界中の河川の洪水リスクを分析可能	グローバルな流域水リスクに加えて操業上の水リスクを評価可能 国単位の詳細な解析が可能	特定地域（インド）の地下水に着目

2

自然との接点の分析ツール

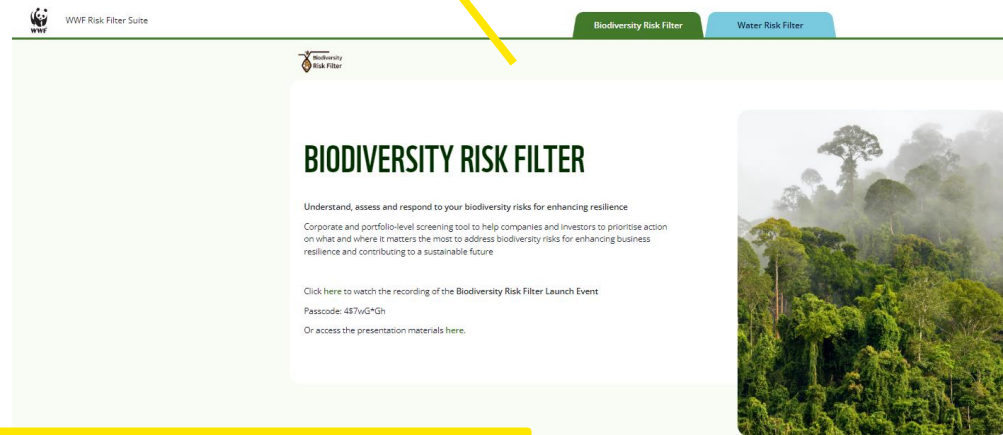
自然との接点の分析に使えるツール紹介 (WWF Biodiversity Filter)

- ▶ **概要**：世界の地域毎、サプライチェーン段階毎の生物多様性リスクを特定し、生物多様性に対する企業の行動に優先順位を付けるための企業およびポートフォリオレベルのスクリーニングツール。
- ▶ **TNFDによる活用フェーズ**： L2、L3、L4、E1、E2、E3、A1、A4、P1、P2、P3
- ▶ **何ができるか**：
 - ▶ Inform（通知）：すべての産業セクターの生物多様性への直接的な影響と依存の概要および特定の業界セクターの直接的な影響と依存関係をより詳細な調査が可能。
 - ▶ Explore（調査）：地域ごとに生物多様性に関するリスクを特定できる。マップレイヤー、国別プロフィール（2023/8/29現在開発中）、データ（最新のWWF出版物等）の探索が可能。
 - ▶ Assess（評価）：事業、サプライチェーン、投資全体の生物多様性リスクを評価できる。
 - ▶ Respond（対応）：生物多様性リスクを軽減し、レジリエンスを強化するための情報を提供（2023/8/29現在開発中）
- ▶ **利用料**：無料で使用可能（Assessはユーザー登録が必要）

出所：[WWF Biodiversity Risk Filter](https://riskfilter.org/biodiversity/home) (https://riskfilter.org/biodiversity/home)

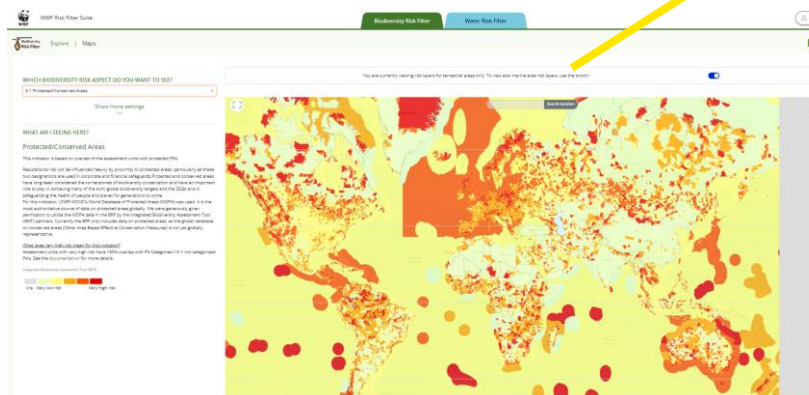
2 自然との接点の分析ツール 自然との接点の分析に使えるツール紹介 (Biodiversity Risk Filter : イメージ)

▶ WWF Biodiversity Risk Filter トップページ



▶ Informでセクター
毎の依存と影響の
程度がわかる

▶ Mapsで各地域の生物多様性リスクをマッピング



Indicator #	BRF Indicators	Impact/ Dependency	Industry																										
			Agriculture (animal products)	Agriculture (plant products)	Appliances & General Goods	Automotive, Electrical	Chemicals & Machinery	Chemicals & Other Materials	Construction Materials	Electric Energy Production - Combustion (Biomass, Coal, Gas, Nuclear, Oil), Geothermal	Electric Energy Production - Hydro	Electric Energy Production - Solar, Wind	Electronics & Semiconductor	Fishing and aquaculture	Food & Beverage Production	Food Retailing	General or Specialty Retailing	Health Care, Pharmaceuticals and Biotechnology	Hospitality Services	Land Development & Construction	Metals & Mining	Offices & Professional Services	Oil, Gas & Consumable Fuels	Paper & Forest Product	Production Services (including wineries)	Textiles, Apparel & Luxury Goods	Transportation Services	Water utilities / Water Service Providers	Other (Average of all sectors)
Physical Risk																													
Provisioning Services																													
1.1	Water Scarcity	Dependency	5	5	4	4	4	5	5	5	3	4	5	5	2	2	4	4	4	3	5	2	4	5	2	5	4	5	4
1.2	Forest Productivity and Distance to Markets	Dependency	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	2	4	4	0	4	5	2	5	2	0	1
1.3	Limited Wild Flora & Fauna Availability	Dependency	1	1	0	3	1	1	0	0	0	0	3	3	0	0	3	2	2	0	0	0	3	0	2	0	0	0	1
1.4	Limited Marine Fish Availability	Dependency	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1
Regulating & Supporting Services - Enabling																													
2.1	Soil Condition	Dependency	4	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	5	0	0	0	0	1
2.2	Water Condition	Dependency	5	4	3	2	3	2	2	2	2	2	2	2	5	4	2	3	4	2	2	0	2	4	2	2	2	4	3
2.3	Air Condition	Dependency	3	3	2	2	2	2	2	2	2	2	2	2	2	3	2	1	1	3	3	3	3	3	3	0	2	2	2
2.4	Ecosystem Condition	Dependency	2	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	4	0	0	0	0	1
2.5	Pollination	Dependency	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1
Regulating Services - Mitigating																													
3.1	Landslides	Dependency	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	5	5	4
3.2	Wildfire Hazard	Dependency	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5	3	3	4	4	3
3.3	Plant/Forest/Aquatic Pests and Diseases	Dependency	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	4	1	0	0	0	4	0	0	0	0	1
3.4	Herbicide Resistance	Dependency	4	4	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	1	0	0	4	0	0	0	0	2
3.5	Extreme Heat	Dependency	5	5	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	4	4	4	4	4	5	3	3	4	4
3.6	Tropical Cyclones	Dependency	5	5	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	5	4	4	5	5	4

出所 : [WWF Biodiversity Risk Filter](https://riskfilter.org/biodiversity/home) (https://riskfilter.org/biodiversity/home)

2

自然との接点の分析ツール

補足：TNFD紹介ツール会員登録、無料・有料の違い

	会員登録無	会員登録（無料）	会員登録（有料）
IBAT	使用不可	基本的なIBAT機能は使用可能（マップデータを見るなど）。また、IBAT上でSitesを作成と保存可能	IBATが使用しているGISデータや分析しているデータがダウンロード可能（従量課金制）
ENCORE	業界、サブ業界、生産工程に基づく、影響において依存・影響の要因や資産の側面に関する評価結果を確認可能	依存性と影響スコアをグラフィカルに表示、詳細なレポートのダウンロード、独自のダッシュボードをカスタマイズし、将来使用できるように設定を保存が可能	-
Global Forest Watch	会員登録（無料）以外の機能の使用は可能	興味のあるエリア（AOI）を作成と保存、・AOI上の火災アラート、・AOI上の森林面積の変化アラート、AOI上の月次サマリーが可能	-
WRI Aqueduct - Water Risk Atlas	全機能使用可能	-	より高い空間的および時間的解像度を含む、分析に使用される生データに早期にアクセス可能
WWF Water Risk Filter	Explore（調査）機能使用可能	- Explore（調査）使用可能 - Assess（評価）使用可能 - データをアップロードして保存可能	-
WWF Biodiversity Risk Filter	Inform（通知）、Explore（調査）機能使用可能	- Inform（通知）使用可能 - Explore（調査）使用可能（2023/8/29現在開発中） - Assess（評価） - Respond（対応）（2023/8/29現在開発中）	-

出所：各ツールHPよりEY作成

3

ツールを使用した分析結果の開示例

IBATは、自社拠点の周辺の生物多様性の重要性の評価に利用されている。

Charoen Pokphand Group（タイ最大の複合企業）の事例

3.1 INTERFACE WITH NATURE

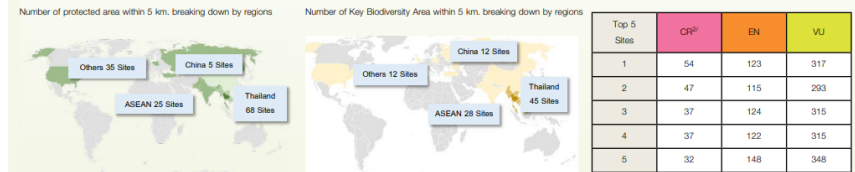
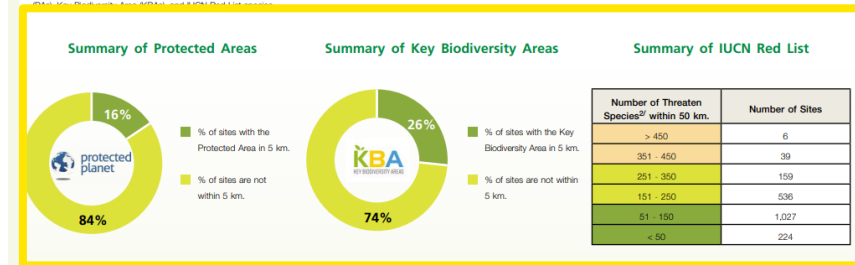
We are aware that the nature and biodiversity risk could arise from the business footprint, particularly from the operation site that is near or within the wilderness and biodiversity hotspot areas. Therefore, we have assessed the interface with the nature by mapping the location of the site globally with the ecosystem type, biomes, biodiversity importance using the TNFD recommended tools, including IBAT, Global Forest Watch, Encore, and Aqueduct.

As industrial conglomerate with diversified businesses, this process help us to gain more understanding more about the interaction between our operation with the natural resources surrounding, current status and potential change of ecosystem in the future. This is the initial step to identify the nature-related risk.



BIODIVERSITY IMPORTANCE

C.P. Group has undergone the rapid screening of biodiversity-related risk. The operating sites from all business units have been assessed using IBAT program that integrates 3 database, including Protected Areas



- ▶ 事業サイトと自然との接点の評価に、TNFDが紹介するIBAT等のツールを用いている。
- ▶ 自然関連リスクを特定するための最初のステップと位置付けている。

- ▶ 生物多様性の重要性評価に、IBATから入手した Protected Areas、Key Biodiversity Areas、IUCN Red Listの定量情報を利用し、開示している。

出所 : [Charoen Pokphand Group Biodiversity \(TNFD\) Report 2022](https://www.cpgroupglobal.com/storage/document/additional-topic-specific-reports/2023/biodiversity-tnfd-report-2022-th.pdf)

(<https://www.cpgroupglobal.com/storage/document/additional-topic-specific-reports/2023/biodiversity-tnfd-report-2022-th.pdf>)

3

ツールを使用した分析結果の開示例

ENCOREは、生態系サービスと企業活動との接点の評価および関係性の整理をすることで、重要セクターの特定に利用されている。

SMBCグループの事例

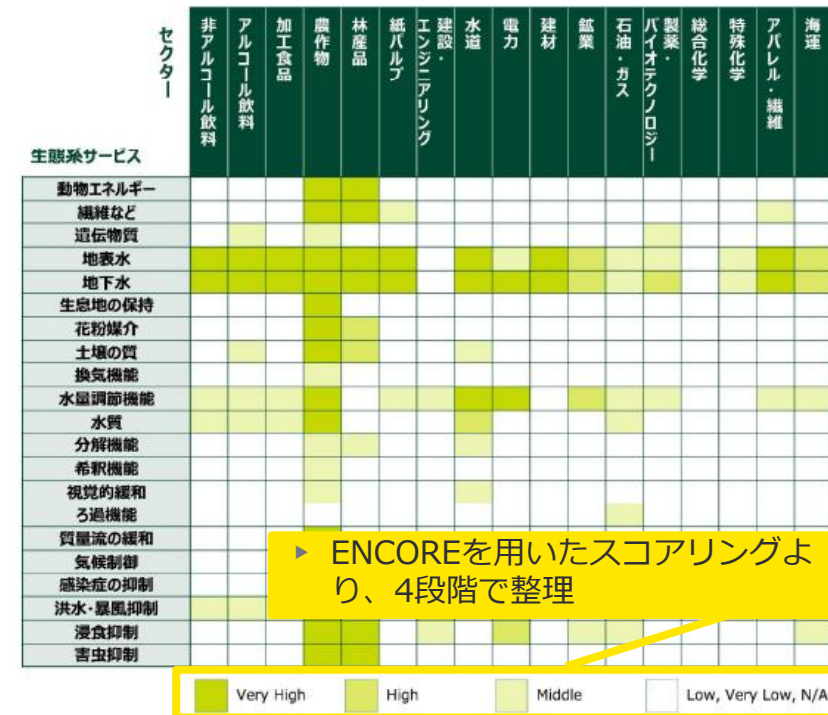
① 企業活動における自然資本への依存

企業は、自然資本が生み出す生態系サービスを便益として享受しています。ENCOREによる分析に基づけば、企業は生態系サービスから「原材料としての直接利用」「生産プロセスの補助」「間接的影響の低減」「災害の抑制」といった4つの経路で便益を享受しています。

図表 3-4 企業活動と自然資本・生態系サービスの関係性（依存の観点）



図表 3-10 依存に関するヒートマップ



- ▶ ENCOREを用い、依存・影響それぞれの観点で、自然資本が提供する生態系サービスと企業活動との接点を分析している。
- ▶ ENCOREの分析結果を基に、企業活動と自然資本・生態系サービスの関係性（依存及び影響）について整理している。

出所：SMBCグループ 2023 TNFDレポート

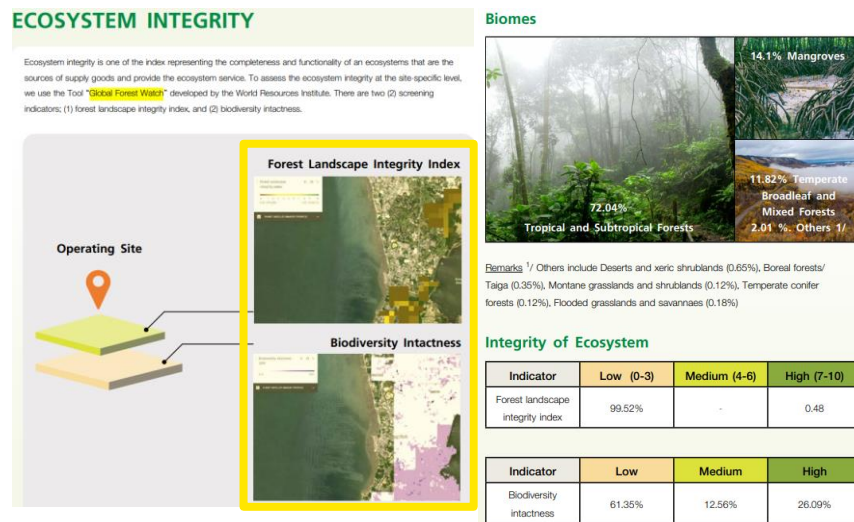
(https://www.smfg.co.jp/sustainability/materiality/environment/naturalcapital/pdf/tnfd_report_j_2023.pdf)

- ▶ ENCOREを活用してヒートマップを作成し、自然資本との関連性が高いとされるセクターの依存・影響の度合いを整理し、特に重視すべき自然資本・生態系サービスやセクターを特定している。

3 ツールを使用した分析結果の開示例

Global Forest Watchは、森林に関して、自社事業の自然との接点の分析(L)及び依存・影響の診断に利用されている。

Charoen Pokphand Groupの事例



- ▶ Global Forest Watchを用い、事業サイト単位での生態系の完全性（Ecosystem integrity）を評価している。
- ▶ Global Forest Watchの数ある指標の中から、Forest Landscape Integrity Index（森林景観完全性指標）、Biodiversity Intactness（生物多様性の保全性）を、スクリーニング指標として採用している。

出所：Charoen Pokphand Group Biodiversity (TNFD) Report 2022

住友林業の事例

診断する (Evaluate)	
E1 関連する環境資産と生態系サービスの特定	約20か国から木材を調達しています。
E2 依存関係と影響の特定	WWF Biodiversity Risk Filterによると森林製品に関する産業は、下記項目が特にリスクが高いとされています。 ①水の希少性 ②木材の入手制限 ③土壌の状態 ④地すべり ⑤火災の危険性 ⑥猛暑 ⑦熱帯低気圧 ⑧土地・淡水・海域の利用変化 ⑨森林の樹冠減少 ⑩保護・保全地域 また、Global Forest Watchで過去20年間の各地域の森林減少の程度と原因を調べました。
E3 依存関係の分析	上記8地域でリスク評価を実施しました。（WWF Biodiversity Risk FilterとGlobal Forest Watch）
E4 影響の分析	上記8地域でリスク評価を実施しました。（WWF Biodiversity Risk FilterとGlobal Forest Watch）

Global Forest Watchの森林の増減に関する指標	
被覆樹木の増加	被覆樹木が増加している領域を特定するものです
被覆樹木の減少	被覆樹木が減少している領域を特定するものです
被覆樹木の増減	被覆樹木の正味の増減を特定するものです
被覆樹木の損失に関する支配的要因	被覆樹木の損失に関する支配的要因とその程度を示すものです

- ▶ E2、E3、E4にて、Global Forest Watchを使用している。
- ▶ E2では、過去20年間の各地域の森林減少の程度と原因を、E3、4では、木材輸入量が多い8地域でのリスク評価にGlobal Forest Watchの森林の増減に関する指標を使用している。
- ▶ Lに関しては、住友林業のビジネスを俯瞰し、森林と接点を持っていると特定し、優先地域、セクターの特定に繋がっている。

出所：生物多様性保全に関する方針と目標 | 住友林業
(<https://sfc.jp/information/sustainability/environment/biodiversity/index.html>)

3 ツールを使用した分析結果の開示例

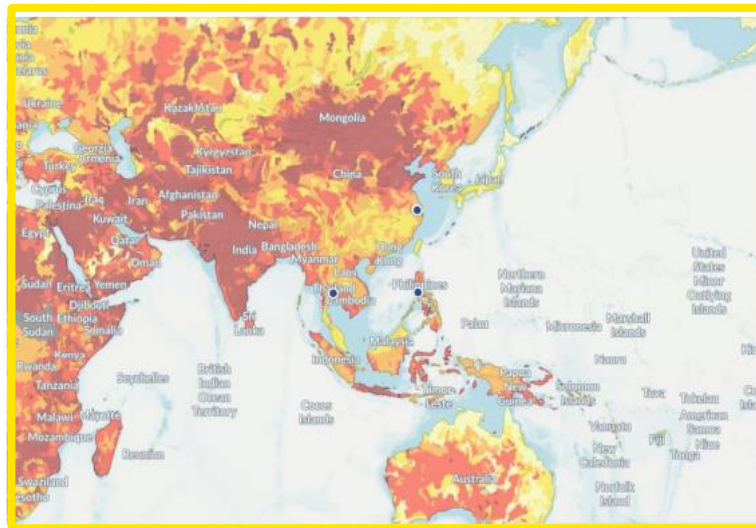
WRI Aqueduct - Water Risk Atlasは、国内外グループ拠点の水リスクの評価に利用されている。

日本電気株式会社（NEC）の事例

リスクと拠点の特定 —水関連リスク(水資源への依存、排水の影響など)—

Aqueduct を用いたリスク分析や、NEC 独自の水リスク管理アンケートをもとに、国内外の各生産拠点でのような水リスクがあるのか特定しました。NEC グループの国内外の 392 拠点のうち、生産に関わる 28 拠点を Aqueduct により評価したところ、中国 江蘇省 蘇州市にある2拠点、タイ バトゥムターニー、フィリピン カヴィテの事業場が水関連リスクのあるエリアに立地していると確認されました。

図 7 : Aqueduct を用いた水リスク分析



出典: Aqueduct

図 8 : 水関連リスクのある生産拠点

拠点	所在地	Aqueductにより高リスクと評価された内容
A	中国 蘇州	水ストレス、河川洪水、干ばつ、下水処理インフラ不足、衛生的なトイレへのアクセス
B	中国 蘇州	水ストレス、河川洪水、下水処理インフラ不足、衛生的なトイレへのアクセス
C	タイ バトゥムターニー	水ストレス、河川洪水、干ばつ、下水処理インフラ不足、評判/ブランドイメージ
D	フィリピン カヴィテ	下水処理インフラ不足

出典: Aqueduct をもとに NEC が作成

▶ 高リスクである理由も含めて開示。

2.4.2. バリューチェーンの上流

バリューチェーンの上流である調達取引先に対しては「サプライチェーンにおける責任ある企業行動ガイドライン」にて、生物多様性、水、土壌を含めた環境保全に取り組むよう求めています。また毎年実施しているサプライヤーアンケートにおいても取り組み状況を調査しています。

今回は、NEC の一次調達取引先のうち、自然資本への影響が相対的に高いと考えられるハードウェア購入先について、その生産拠点約2000拠点のリスクをAqueductによって評価をしました。その結果、リスクがある場所に立地している拠点は1%以下であり、今後詳細調査を行うことを検討しています。

- ▶ Aqueductを用いて、水リスクのあるエリアに立地している直接操業4拠点を特定している。
- ▶ バリューチェーン上流（生産拠点約2000拠点）の水リスクについて、Aqueductを用いて評価している。

出所: [NEC TNFD レポート 2023](https://jpn.nec.com/sustainability/ja/eco/pdf/NEC-tnfd-2023-j.pdf)
(<https://jpn.nec.com/sustainability/ja/eco/pdf/NEC-tnfd-2023-j.pdf>)

3 ツールを使用した分析結果の開示例

WWF Water Risk Filter及びWWF Biodiversity Risk Filterは、VCの優先順位付けや地域ごとのリスク評価に利用されている。

キリンHDの事例

試行的な優先順位付け

国	製造拠点	水ストレス	取水量	生物多様性のリスク
アメリカ	Biokyowa	★★★★★	★★★★★	★★★
タイ	Thai Kyowa Biotechnologies	★★★★★	★★★★★	★★★
日本	協和ファーマケミカル	★★★★★	★★★★★	★★★
日本	キリンビール取手工場	★★★★★	★★★★★	★★★
日本	キリンビール横浜工場	★★★★★	★★★★★	★★★
日本	キリンディスティラリー御殿場工場	★★★★★	★★★★★	★★★
日本	協和キリン富士事業場	★★★★★	★★★★★	★★★
オーストラリア	ライオン Tooheys Brewery	★★★★★	★★★★★	★★★
日本	キリンビール 名古屋工場	★★★★★	★★★★★	★★★
中国	上海協和アミノ酸	★★★★★	★★★★★	★★★
日本	キリンビバレッジ 湘南工場	★★★★★	★★★★★	★★★
オーストラリア	ライオン Castlemaine Perkins Brewery	★★★★★	★★★★★	★★★
中国	麒麟啤酒 (珠海) 金鼎工場	★★★★★	★★★★★	★★★
アメリカ	New Belgium Brewing Fort Collins	★★★★★	★★★★★	★★★

※水ストレスは、利用可能な水資源量について評価する3つの指標 (AqueductのBaseline water Stress, Water Risk FilterのBaseline Water DepletionとBlue Water Scarcity)を用いて評価

※取水量は、水ストレスが高い14拠点の総取水量に対する割合

※生物多様性は、製造拠点の流域のIUCNレッドリストに基づいて算出された指標 (START (Species Threat Abatement and Restoration, threat-abatement: 脅威の軽減)とSTARR (restoration: 復元))のスコアと、製造拠点の流域から半径50km圏内に魚類、両生類、カメ、甲殻類、トンボなど水域に生息するBiodiversity elements triggering KBA criteriaが存在するか否かで評価

- ▶ Water risk filterを使用して、製造拠点の流域の水量についての水ストレスと影響（取水量）を調査し、優先順位付けを実施している。
- ▶ 生物多様性に関しては、製造拠点の流域のIUCNレッドリストに基づいて算出された指標のスコアと、製造拠点の流域の半径50km圏内のKBAの存在から評価している。

出所：キリングループ環境報告書2022

https://www.kirinholdings.com/jp/investors/files/pdf/environmental2022_04.pdf

住友林業の事例

診断する (Evaluate)

E1 関連する環境資産と生態系サービスの特定	約20か国から木材を調達しています。
E2 依存関係と影響の特定	WWF Biodiversity Risk Filterによると森林製品に関する産業は、下記項目が特にリスクが高いとされています。 ①水の希少性 ②木材の入手制限 ③土壌の状態 ④地すべり ⑤火災の危険性 ⑥猛暑 ⑦熱帯低気圧 ⑧土地・淡水・海域の利用変化 ⑨森林の樹冠減少 ⑩保護・保全地域 また、Global Forest Watchで過去20年間の各地域の森林減少の程度と原因を調べました。
E3 依存関係の分析	上記8地域でリスク評価を実施しました。(WWF Biodiversity Risk FilterとGlobal Forest Watch)
E4 影響の分析	上記8地域でリスク評価を実施しました。(WWF Biodiversity Risk FilterとGlobal Forest Watch)

WWF Biodiversity Risk Filterのリスク評価指標

指標名	性質	説明
水の希少性	依存性	淡水資源が豊富か不足しているかを意味します
木材の入手制限	依存性	実現可能な木材供給の量と木材の入手しやすさを意味します
土壌の状態	依存性	土壌有機炭素 (SOC) 含有量に基づいています
地すべり	依存性	降雨や地震によって引き起こされる地すべりの潜在的な脅威を評価するものです
火災の危険性	依存性	気象の状況による山火事の潜在的な脅威を評価するものです
猛暑	依存性	5年間の再現期間中の異常な暑さの脅威を評価するものです
熱帯低気圧	依存性	50年周期で予測される最大風速 (mph) を評価するものです
土地・淡水・海域の利用変化	影響	農地の拡大、河川の分断、海運など人間の直接的な影響による海洋環境に対する圧力を測定します
森林の樹冠減少	影響	森林の樹冠の減少を測定するものです
保護・保全地域	影響	評価ユニットと重なる保護・保全地域を示すものです

- ▶ E2、E3、E4にて、WWF Biodiversity Risk Filterを使用している。E2では、森林製品に関する産業がリスクが高い項目の抽出を、E3、4では、木材輸入量が多い8地域でのリスク評価にWWF Biodiversity Risk Filterのリスク評価指標を使用している。

出所：生物多様性保全に関する方針と目標 | 住友林業 (sfc.jp)



自然との接点の分析に活用できるツールの紹介

自然関連財務情報開示のためのワークショップ《ベーシック編》

第1回 自然との接点の分析に活用できるツールの紹介・実践

2023年09月15日

受託者：EYストラテジー・アンド・コンサルティング株式会社 EY新日本有限責任監査法人