Thought Leadership

Taking root

Mainstreaming natural capital accounting to meet global biodiversity goals

A report by the UBS Sustainability and Impact Institute
July 2023

UBS

Contents

Author:
William Nicolle

Editor:
Richard Morrow

Reviewers:
Judson Berkey, Teresa Nielsen, Gaspard Jeanneret, Christian Leitz, Gillian Dexter, Richard Mylles, Mike Ryan, Jackie Bauer

Project Management:
Jackie Bauer

The author thanks the following people for their input: Kenneth Bagsted (United States Geological Survey), Sir Partha Dasgupta (University of Cambridge), Pavan Sukhdev, Sam King, and Sneha Phalke (all from GIST Impact), Charles Holmes (Accenture), Carter Ingram (Pollination Group), Johan Lammerant (Arcadis), Michael Vardon (Australia National University), Eva Zabey and Michael Ofosuhene-Wise (both from Business for Nature).

Executive Summary

The UN's goal to halt and reverse biodiversity loss by 2030 is an ambitious target that looks increasingly unrealistic as the deadline approaches. Biodiversity is diminishing at an alarming pace, in the process exposing the world's nature-dependent global gross domestic product (GDP)—about 55% of the total—to disruption. It's increasingly clear that the world needs new tools to sustainably manage environmental resources for the long term.

Natural Capital Accounting (NCA) could be an integral part of the solution. First introduced in the 1970s, it is an economic approach that weaves the value of natural assets into decision making throughout markets—enabling organizations to account for their impact and dependence on natural capital (and therefore biodiversity) every time they make an economic or financial decision.

The struggle to become mainstream

But despite being almost half a century old, NCA has struggled to mainstream. Natural assets continue to be excluded as a core component of GDP calculations. Instead, they are compiled in separate, secondary accounts. Few nations heavily invest to create complete natural capital accounts, and as a result the NCA figures that exist are often disregarded by companies, financial institutions, and investors. NCA as it stands today has little impact on biodiversity trends.

The failure of the framework to gain more traction is largely down to slow top-down attempts by governments and multilateral institutions to adopt NCA. A combination of factors—including the relative youth of these frameworks, the difficulty of translating, tallying, and then converting environmental data into monetary value—prevents NCA solutions from being broadly adopted.

Bottom-up can be the solution

This report argues NCA can only contribute to the UN's 2030 goal through more concerted mainstreaming efforts by 'bottom up' organizations, such as financial institutions and investors, corporates, and non-governmental organizations. If these organizations can be persuaded of the merits of taking NCA seriously, they can help to supply the statistics and refine the methods necessary to generate reliable figures. Their engagement could provide important pressure on governments and regulators to meet and enforce NCA requirements more seriously.

The paper presents five strategies with case studies to provide private sector organizations with inspiration: proving the business case for NCA; providing governments with data; establishing its methodological credibility; ensuring the future of sustainability reporting; and innovating within standardized frameworks. The paper concludes with an idealized roadmap out to 2030 for how NCA could be brought into the mainstream of economic accounting.

The road remains shaky

It should be underscored that NCA presents a diagnosis for biodiversity loss rather than a cure. But, if it can be broadly introduced, the framework would enable governments, financial institutions, investors, corporates, NGOs and more to calculate both the state of local and regional ecosystems and the economic cost if they are further damaged—helping organizations identify and implement the most effective countermeasures.

The UN's 2030 biodiversity reversal target could already be out of reach, but it remains important for the world to coalesce around a natural capital quantitative process as soon as possible, so that we can quantify the problem of biodiversity loss and begin to reverse it.

1. Accounting for environmental impact

At a glance

- The UN aims to halt and reverse biodiversity declines by 2030. Current trends imply this will be hard to achieve.
- Natural capital accounting offers a promising solution if it can be mainstreamed quickly.

Decades of focus on expanding output comes at an immense cost to the global environment. For instance, the relative abundance of monitored wildlife populations declined 69% between 1969 and 2018[1]. Global fish stocks followed a similar path, with only 65% at a biologically sustainable level today, down from over 90% in 1974[2]. These trends are unprecedented on a human time scale, given that species extinction rates are now tens to hundreds of times higher than at any time over the past 10 million years[3].

These trends are clearly unsustainable, but society is only beginning to understand their economic and social significance. Most studies conclude we have a substantial economic dependence on nature: one analysis found 55% of the world's gross domestic product (GDP) is moderately or highly dependent on nature[4]; and World Bank modeling suggests declining ecosystem services could materially reduce GDP, particularly among the poorest nations (Figure 1).

[1] WWF (2022), Living Planet Report 2022—Building a nature-positive society

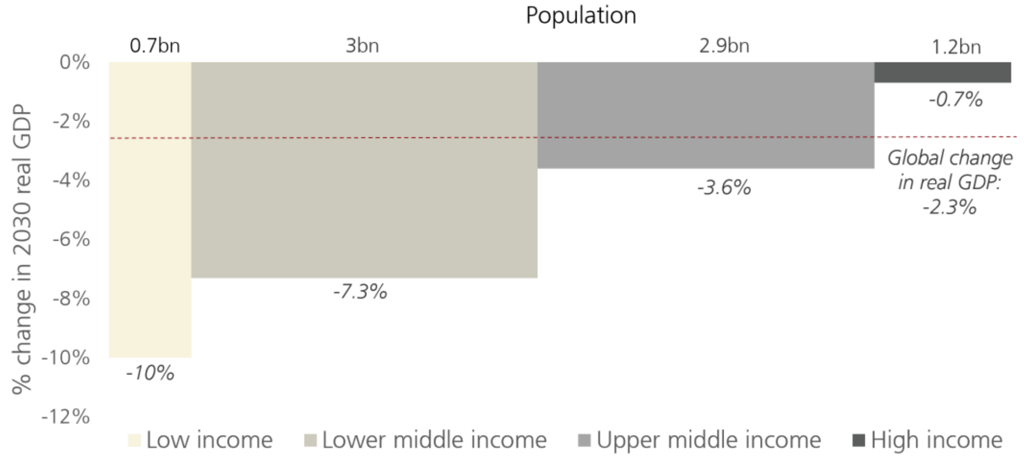
[2] FAO (2022), The State of World Fisheries and Aquaculture 2022: Towards blue transformation

[3] IPBES (2019), Global assessment report of the intergovernmental science-policy platform on biodiversity and ecosystem services.

[4] PwC (2023), Managing Nature Risk: From understanding to action.

Figure 1. Declining ecosystem services could cost the world 2.3% in annual GDP by 2030.

Change in 2030 real GDP under a partial ecosystem collapse scenario vs. a no-tipping-point scenario.



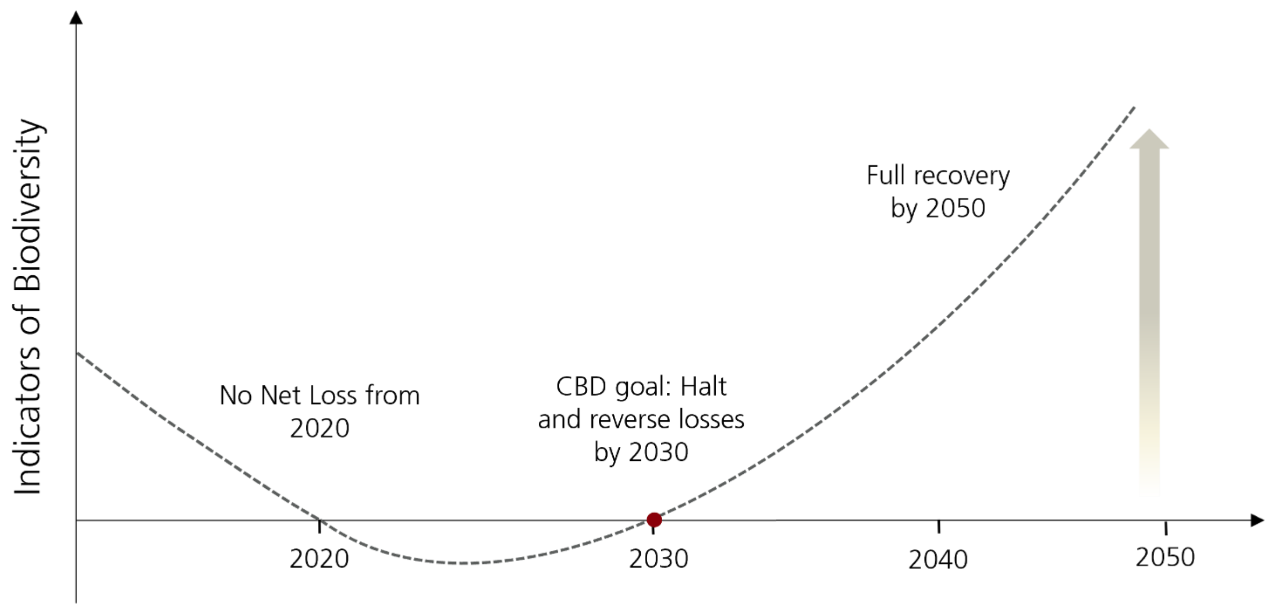
Source: UBS; Johnson, J. et al (2021), The Economic case for nature, World Bank Group.

1.1. The 2030 biodiversity goal and the promise of Natural Capital Accounting

The evidence paints a gloomy picture, but a few glimmers of light break through. For instance, the UN Convention on Biological Diversity's (CBD) headline aim to 'halt and reverse' of biodiversity loss by 2030 (Figure 2)—a hugely ambitious goal agreed between almost 200 countries—reflects a strong global consensus to upend long-running environmental decline.

Figure 2. The Convention on Biological Diversity aims to make the world 'nature positive' by 2030.

This conceptual figure shows the trends in biodiversity indicators required to meet the Convention on Biological Diversity's goal to become 'nature positive' from 2030.



Source: UBS; WWF (2022), *Living Planet Report*.

But setting a target is a lot easier than meeting one, and the world's biodiversity remains in a tailspin just seven years away from the CBD's 2030 deadline. We need to identify and agree upon new approaches to conserve and restore nature, quickly.

NCA could be an integral part of the solution (Box 1). Society exploits nature so unsustainably because its value is often overlooked in economic and political decision making. Governments tend to make decisions using the latest GDP figures—which completely ignore the value of natural capital[5]—and corporates often fail to consider factors like their dependence on water tables, timber supplies and pollinators. All would do well to consider the extent that their wealth depends on ecosystem services, but particularly those—such as agriculture-dominated countries or water-intensive industries—where nature depletion can create material economic and financial risks.

Box 1: What is Natural Capital Accounting?

NCA emerged in the 1970s as a framework for conceptualizing how society impacts and depends on nature. It classifies nature into 'stocks' (such as land), which can be renewable (forests) and non-renewable (fossil fuels). Nature-related 'services' (i.e., benefits and costs) flow from these stocks.

A detailed overview of NCA is beyond the scope of this report—it can be found in a recently published UBS whitepaper[6]—but the framework has a key goal in mind: 'what can be measured, can be managed'. NCA seeks to measure and then integrate nature's value into accounting practices, from government statistics to corporate reports. By doing so, organizations can take account of their dependence on natural capital (and therefore biodiversity) every time they make an economic or financial decision (Box 2).

Box 2: Biodiversity emerges from healthy natural capital

Biodiversity is a different concept to natural capital, despite analyses often using them interchangeably. Simply put, biodiversity is a measure of the variability in living things which can be expressed on different 'levels', such as between genes, species, or ecosystems. Its metrics differ depending on what is being measured. Natural capital is an economic metaphor for the total stock of physical (non-living) and biological (living) stocks, and their limited capacity to produce ecosystem services. Higher biodiversity emerges from healthier 'living' natural capital, in practice making it a subset of natural capital.

Advocates of NCA believe that introducing it enables firms (or governments) to better understand the reliance of their business model (or economic policy) on ecosystem services. The hope is that they would more carefully weigh projects that seek to make money in the short run by depleting natural capital, over time shifting their mindset from output economics to impact economics.[7]

[5] UBS Sustainability and Impact Institute (2023), *There's a problem with GDP: GDP is an incomplete measure. It counts the price of everything but the impact of nothing.*

[6] UBS (2022), From Ozone to Oxygen: Opportunities and Risks in Natural Capital.

[7] See UBS Sustainability and Impact Institute (2023), The rise of the Impact Economy: Evolving to the next level.

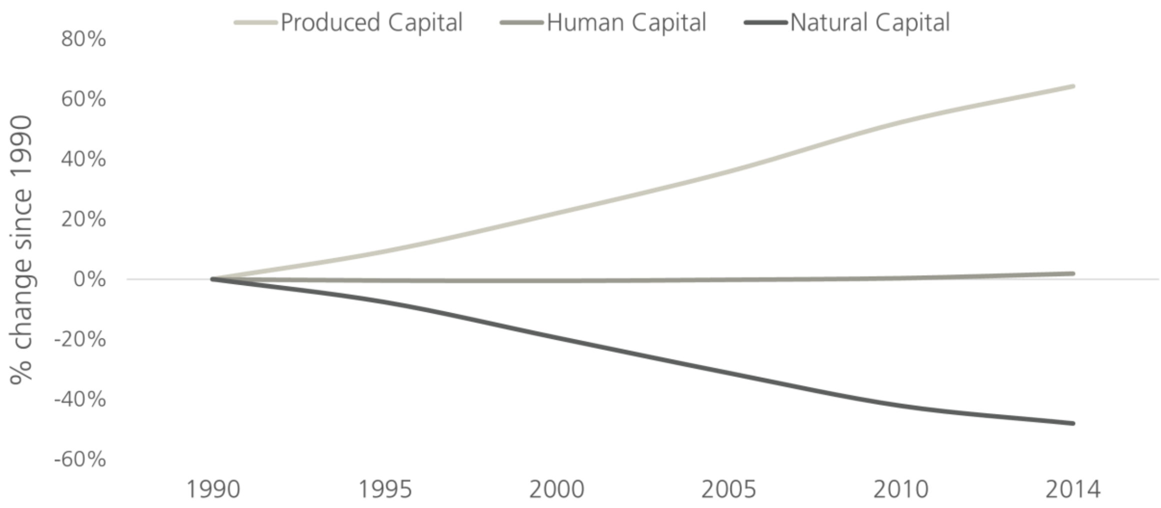
1.2. Now more than ever

NCA is not a new concept. It was first introduced in the 1970s and has been promoted in international frameworks since the 1990s. Unfortunately, it has had little impact to date on policy making and attitudes to economic decision making.

Few governments have comprehensive national natural capital accounts, and corporates and investors rarely use it. All too often these organizations seem to regard accounting for nature as a zero-sum endeavor, costing revenue while offering few tangible insights. Short-term incentives such as quarterly profit targets exacerbate this mindset—even as the world's natural capital continues to decline (Figure 3).

Figure 3. The value of natural capital per capita has declined by around 48% since 1990.

Natural capital's value per capita declined 2.6% per annum between 1990 to 2014. Note the global population grew by 1.3% per annum over the same period, meaning the value of natural capital declined closer to 1.3%.



Source: UBS; Managi and Kumar (2018), *Inclusive wealth report 2018*

Fundamental and concerted efforts are needed to halt and reverse biodiversity loss, or the world's environment will degrade even further—increasing the risk of harm to many economic sectors and human habitats.

NCA arguably offers the best way to integrate nature into the decisions that are made throughout an economy, from governments to corporates and across value chains. It could, if widely used, help to track changes to the living natural capital that defines biodiversity trends. But if NCA is to be effective, it needs to be broadly recognized, implemented, and enforced. Today it remains niche and far from mainstream accounting practices.

This report outlines why mainstreaming NCA is important to increase the chances of meeting the CBD's 2030 goal. It looks at the state of current progress, which has been slow and largely top-down, driven by governments. It then considers how to encourage corporates, investors, and NGOs[8] to conduct more 'bottom-up' activity to help mainstream NCA and increase its contribution to the CBD's 2030 goal.

[8] This report uses a high-level definition of NGOs, referring to any private, independent non-profit organizations that operate separately from government, covering academic bodies, think tanks and industry collaborations.

2. It takes two to tango

At a glance

- NCA emerged from academia decades ago[9], and since then governments have driven its development from the top down.
- Governments play a vital role, but NCA's mainstreaming is proving too slow to meaningfully support the CBD's 2030 goal.
- Complementary efforts from finance, corporates, and NGOs (the 'bottom') can expedite its development and eventual mainstreaming.

2.1. Top-down progress: Necessarily slow?

The story behind the introduction of NCA starts with the System of National Accounts (SNA). The SNA was conceived in the 1930s, standardized by the UN in 1953, and has been periodically revised ever since. It builds up a country's GDP from market transactions to provide a measure of its output.

Over the latter half of the 20th Century, several prominent critics chastised GDP for what it fails to cover. As US Democratic politician Robert Kennedy famously noted in March 1968, GDP "measures everything… except that which makes life worthwhile"[10]—focusing too much on how much is produced ('the output economy'), rather than what people really value ('the impact economy').[11]

Prominent critics pointed in particular to the absence of the value of nature in GDP's metrics. In 1974 American economists William Nordhaus and James Tobin provocatively asked, 'Is growth obsolete?', arguing measures that included the costs of environmental problems and urbanization were better reflections of welfare[12]. These critiques gained traction and, eventually, impacted policy. Riding on the coattails of the 1992 'Rio Summit', the UN revised the SNA in 1993, broadening it to include 'supplemental accounts' for energy, water, and land.

That led countries to begin measuring their environmental impact, albeit in a piecemeal fashion. For instance, in 1996 many countries analyzed their environmental stocks and flows for the first time when reporting GHG emissions and carbon sequestrations. In 2007, the European Commission concluded that the SNA and GDP should be complemented with economic and social indicators. Four

[9] For a brief history see Brandon, C. et al (2021), *Integrating natural capital into national accounts: Three decades of promise and challenge.*

[10] Centre for the Understanding of Sustainable Prosperity (2018), *'Everything, in short, except that which makes life worthwhile'*.

[11] See UBS Sustainability and Impact Institute (2023), The rise of the Impact Economy: Evolving to the next level.

[12] Nordhaus, T. and Tobin, J. (1972), *Is growth obsolete?,* NBER.

years later, the World Bank, International Monetary Fund and World Trade Organization complemented GDP via satellite accounts on the environment.

Crucially, these additional metrics continued to be excluded when calculating GDP. Instead, two sets of national accounts were established—the SNA, and 'satellite' accounts, which include the environment[13]. Generally, these satellite environmental accounts were seen as less important and thus some countries report them poorly, leading companies and investors to pay them little attention.

Ideally GDP would directly account for natural capital, making it a core component of its calculations and thus impossible to ignore[14]. However, in line with 'don't let the perfect be the enemy of the good', environmental accounts offer a useful tool for tracking nature's health at a time when there is no consensus on how to integrate natural capital with conventional macroeconomics.

2.2. Natural capital in environmental accounts

Today many countries are busy compiling environmental accounts. Like the conventional SNA, these require a framework to standardize natural capital measurement. The UN Statistical Commission introduced the System of Environmental-Economic Accounting (SEEA) to do just this (Box 3). The eventual aim is to produce a figure reflecting trends in a country's natural capital—'Natural Asset Wealth'[15]—informed by a range of supporting environmental-economic statistics.[16]

Box 3: UN System of Environmental-Economic Accounting

SEEA exists to standardize national natural capital measurement. There are two types of accounts, one of which is more advanced than the other.

The more widely used but basic are the SEEA Central Framework (SEEA CF) accounts. These measure productive natural assets (like water and energy) and their flows back into the environment: like measuring the stock of soil and any changes to it. They can be monetized, but many are simply stock accounts.

SEEA Ecosystem Accounts (SEEA EA) are more sophisticated but less widely used. They measure ecosystem assets and their associated goods and ecosystem services—an approach closer to a natural capital approach than SEEA EF because they measure environments as ecosystems (in terms of extent, condition, and flow of services) and include monetary accounts (valuing the supply and use of ecosystem services, and the NPV of future services).

SEEA CF was introduced in 2012. SEEA EA was introduced in 2014, and majorly updated in 2021.

[13] Notably the 2025 SNA revision plans will put more environmental assets on the SNA balance sheet, but only those with observable market values.

[14] For a recent technical discussion on integrating natural capital *into* GDP calculations (rather than having environmental accounts sit alongside macroeconomic data), see Dohring, B. et al (2023), *Reflections on the role of natural capital for economic activities,* Directorate-Generale for Economic and Financial Affairs, European Commission, Discussion Paper 180 European Economy.

[15] Arrow, K., et al (2004). *Are We Consuming Too Much?*, Journal of Economic Perspectives; Dasgupta, P. (2021), *The Economics of Biodiversity: The Dasgupta Review*, HM Treasury; Hamilton, K., & Hartwick, J. (2014), *Wealth and Sustainability*, Oxford Review of Economic Policy.

[16] Office of Science and Technology Policy, Office of Management and Budget, and Department of Commerce (2023), National Strategy to Develop Statistics for Environmental-Economic Statistics: A U.S. System of Natural Capital Accounting and Associated Environmental-Economic Statistics.

The top-down actions from governments to create national accounts are integral to mainstream NCA. National accounts allow analysts to track changes in national environments, and provide credible data and baselines for companies, NGOs, and investors to use in their own analyses. Only governments can create them.

But despite the irreplaceable role of governments, they have generally been lackluster in mainstreaming national NCA. There are several reasons for this:

- **Some international frameworks are new:** While the 'conventional' SNA has enjoyed decades of refinement and credibility building, SEEA accounts are in their infancy. The non-experimental version of SEEA EA was only published in 2021. Governments are still digesting them.
- **Translating SEEA into domestic accounts is slow:** The SEEA EA has only 41 implementing countries as of 2022, and none of them yet have a full set of accounts[17]. Even countries who are ahead of the pack when it comes to implementing SEEA EA, such as the UK, are still years away from providing comprehensive accounts. The US, which arguably has most resources at its disposal to measure and regularly update its accounts, predicts it will only be able to offer full accounts in 2035 at the earliest[18]—five years after the CBD's 2030 goal. Resource- and expertise-strapped governments will probably take longer.
- **Usability and uncertainty:** While the NCA's use is growing, surveys show few policymakers use existing accounts. This is likely because it is difficult to convert environmental data into monetary values, a prerequisite to discussing natural capital alongside GDP[19]. There are several reasons for this. Some uncertainty surrounds SEEA EA and CF methodology; the frameworks are general guides for organizing accounts, with countries given significant freedom to define their own approaches. Plus, statistical offices need to make explicit measurement and valuation decisions, injecting uncertainty into the already-high-cost process of SEEA implementation—potentially creating information silos if sector- or department-specific policymakers are not involved.
- **Data challenges remain:** Creating SEEA EA-aligned accounts mostly involves gathering existing-but-disparate government statistics, avoiding the need for new data. However, the current data landscape is a smorgasbord, creating confusion on what data to use, where to find it, and how to interpret it[20]. For instance, a review of 28 natural capital-related data platforms highlighted considerable variability in their relevance, accessibility, transparency, and flexibility[21].
- **Singing from different hymn sheets:** Implementing officials may simply disagree with NCA, have other priorities, or harbor political concerns, such as NCA highlighting politically sensitive issues (e.g., state over-dependence on or depletion of certain resources)[22]. These political divergences exist across the development spectrum. For instance, after pursuing a national NCA program for the minerals sector in the early 1990s, the US Congress published a stop-order due to

[17] UN Statistical Division (2023), *Global Assessment of Environmental-Economic Accounting and Supporting Statistics 2022*.

[18] Office of Science and Technology Policy, Office of Management and Budget, and Department of Commerce (2023), *National Strategy to Develop Statistics for Environmental-Economic Statistics: A U.S. System of Natural Capital Accounting and Associated Environmental-Economic Statistics.*

[19] Fairbrass, A. et al (2020), *The natural capital indicator framework (NCIF) for improved national natural capital reporting.*

[20] In places governments are tackling this— see the EU's *SELINA* project, a platform to share best practice NCA methodologies, including in the private sector— but the field has a long way to go before standard data and methods emerge.

[21] Green Growth Knowledge Partnership (2020), *Natural Capital platforms and tools for green growth planning.*

[22] Vardon, M. et al (2023), *From COVID-19 to Green Recovery with Natural Capital Accounting.*

political controversy over the account's usefulness[23]. Chile also shelved its early NCA program after highlighting the potential unsustainability of forest-based country's development strategies[24].

Combined, these factors limit NCA's development to a snail's pace, maintaining a low appreciation of the damage being done to natural capital.

[23] Cavanagh, S. et al (2001), *National environmental policy during the Clinton years,* Resources for the Future, P28; Eden, B. (2013), *Reconciling theory and practice in environmental accounting,* Statistics Netherlands.

[24] Hect, J. (2000), *Lessons learned from environmental accounting: Findings from nine case studies,* IUCN as mentioned in Virto, R. et al (2018), *Natural capital accounts and public policy decisions: Findings from a survey,* Ecological Economics.

3. Bottom-up: the missing link?

At a glance

- Private sector organizations can speed up NCA's development by pursuing their own analyses.
- Specifically, bottom-up efforts can mainstream NCA by providing data; establishing credibility; ensuring future reporting is fit-for-purpose; and innovating while standardizing.
- We provide an idealized roadmap out to 2030 for how the bottom-up and top-down can mainstream NCA, maximizing its contribution to the CBD's 2030 goal.

The private sector is responsible for the lion's share of the output economy's environmental impact.[25] This means a microeconomic focus—via bottom-up natural capital accounting—is essential to measure what we hope to manage.

3.1. Biodiversity reporting remains nascent, let alone NCA

Today, bottom-up actions to create transparency around nature impacts and dependencies are still quite nascent.

On the plus side, sustainability reporting is now a norm—with the proportion of the S&P 500 stock index publishing sustainability reports increasing from 20% to 92% from 2011 to 2020[26]. But only 46% of the largest global companies said they at least qualitatively recognize biodiversity loss as a material business risk[27]. Other data paints a similar picture; less than half of companies reporting to the Carbon Disclosure Project consider biodiversity in their strategies[28].

However, there is growing momentum to consider the impact of business activity on nature. While just under half of large corporates recognize biodiversity loss as a risk, this has risen from 28% in 2020[29]. Voluntary reporting initiatives are also making strides, such as the Capitals Coalition and TNFD (UBS is a member of both). When considered alongside regulations like the EU's Corporate Sustainability Reporting Directive (CSRD), they may help to catalyze bottom-up biodiversity data collection, analysis, and reporting in the medium term.

---

[25] See UBS Sustainability and Impact Institute (2023), *The rise of the Impact Economy: Evolving to the next level.*

[26] G&A (2021), *Sustainability reporting in focus.*

[27] KPMG (2022), *Reporting the risk from biodiversity loss*; Survey covers G250 companies.

[28] CDP (2022), *New data shows companies recognizing biodiversity risks but majority not turning commitments into action.*

[29] KPMG (2022), Ibid.

Full NCA reporting by corporates—the 'holy grail' of tracking business impacts and dependencies on nature[30]—is essentially non-existent today. But, like biodiversity reporting, initiatives to encourage NCA are making rapid gains, notably the Value Balancing Alliance's recent EU-funded 'Transparent Project' that aims to standardize corporate NCA (more below)[31].

3.2. What's the incentive?

Despite these undercurrents, barriers common to many areas of sustainability disincentivize private sector organizations from picking up the tools of NCA: the cost of gathering disparate and complicated environmental data; a lack of specialist skills, particularly to analyze specialist geospatial data for ecosystems; and classic attribution issues that sit at the heart of many environmental externalities (is a company responsible for pollution occurring far upstream in its supply chain?). Fortunately, these barriers can all be addressed over time with concerted effort.

A more fundamental hurdle is that today's economic model simply does not incentivize bottom-up actors to adopt NCA. The benefits (and costs) of environmental management accrue over long periods of time and generally flow not just to those doing the managing ('public goods')—discouraging bottom-line focused companies and investors from adopting NCA of their own volition.

In the face of these issues, it's important to lay out the tangible benefits of adopting NCA for private sector organizations, to avoid it being seen as just another expensive reporting burden:

- **Financial opportunity:** NCA is not purely an operational cost. It highlights a business's impact and dependence on nature, helping them identify areas for efficiency gains or cost savings. For instance, recent analysis by management consultant McKinsey highlights how corporates have 12 levers at their disposal to reduce pressures on natural capital that could also generate a positive return on investment to the tune of USD 700 billion by 2050 if implemented fully across the globe[32].
- **Anticipating the coming demands of regulation:** NCA involves collecting and reporting lots of environmental data, helping organizations prepare for the coming wave of biodiversity reporting. For instance, governments are starting to implement Target 15 of the Global Biodiversity Framework, requiring large organizations to assess and disclose their risks, impacts and dependencies on biodiversity by 2030. Further, a key initiative in this space is the Taskforce on Nature-related Financial Disclosures (TNFD), which will create demand for regular biodiversity risk reporting if it treads the same path as the Taskforce on Climate-related Financial Disclosures (TCFD), already mandatory in several countries. This is part of a longer trend towards increasing governance of biodiversity by governments—for instance, the number of biodiversity-relevant taxes roughly doubled between 1990 and 2021[33]—and

[30] Biodiversity accounting involves disclosing impacts on nature through specific drivers, such as water consumption. NCA involves measuring an accounting a company's *dependence and impact* on the natural world through physical stocks & flows and sometimes *monetary values*. Efforts are ongoing to make biodiversity accounting more like NCA, through either reporting principles (see Biodiversity Disclosure Project (July 2023), *2023 Corporate Disclosure Frameworks Tracker)* or standardized guidance (such as the EU-funded (2021—2024) ALIGN project, see UNEP-WCMC et al (2022), *Recommendations for a standard on corporate biodiversity measurement and valuation, Aligning accounting approaches for nature*).

[31] Transparent Project et al (June 2023), *Standardized natural capital management accounting: A methodology for promoting the integration of nature in business decision making.*

[32] McKinsey (2022), *Nature in the balance: What companies can do to restore natural capital;* McKinsey analysed 47 levers, with 12 showing a positive ROI.

[33] OECD (2021), *Tracking economic instruments and finance for biodiversity 2021*.

significant regulations are already emerging today, such as France's requirement for biodiversity foot printing, and the EU's Corporate Sustainability Report Directive (which will require impact reporting) and deforestation due diligence law.

- **Business strategy:** NCA provides companies with greater visibility on their business impact and dependence across generally opaque value chains. For instance, the framework enables businesses to identify and manage nature-related risks—such as their impact on water supplies in areas of high competition—and can help them quantify their dependence on those supplies via monetized figures. Last, the adoption of NCA and the associated data gathering can reduce disclosure and assurance burdens if it is done in a standardized way that facilitates peer comparison[34].

NCA presents tangible benefits for private sector organizations today, and these may well grow in the future—particularly for businesses operating in sectors whose gross value added entirely depends on nature. These include a broad swathe of companies, including those operating in agriculture, forestry, fishery and aquaculture, food, beverages and tobacco, and construction[35].

3.3. Bottom-up strategies

The rest of this paper outlines five bottom-up strategies and an idealized roadmap to help mainstream NCA in support of the CBD's 2030 goal.

1. Prove the business case

While the value of conventional national accounts is almost universally accepted, national NCA remains unproven at scale[36]. This creates a 'Catch-22': a lack of national natural accounts undermines the case for using NCA at the bottom (due to a lack of credible data, low legitimacy, and no national baselines).

Private sector organizations could plug this credibility gap by doing their own NCA. The framework could be normalized and advanced in private sector uses by regularly publishing organization-level NCA assessments in line with well-known standards[37], sharing learnings through industry forums. Proving the business case for NCA and demonstrating clear demand for its implementation would help to address the issue of low credibility of national NCA. That would help to remove a key-but-subtle barrier that is reported across surveys as holding back the framework's top-down development[38].

Pioneer efforts could also 'road test' the data and metrics of national accounts as they emerge to ensure they are fit-for-purpose and business-relevant. Groups such as the Value Balancing Alliance already do this, testing new methodologies to translate environmental and social impacts into comparable financial data, including monetizing nature-related impacts. A sensible starting place could be the TNFD's 'LEAP' framework, which guides organizations to start with the most material areas first[39].

---

[34] Capitals Coalition (2022), *Time to Take Stock: Improving corporate natural capital accounting with asset registers of stocks, ecological equivalency, double entry bookkeeping and statements of position and performance.*

[35] These sectors' GVA is fully dependent on nature, according to PwC (2023), *Managing nature risk*: *From understanding to action.*

[36] Pritchard, R. and van der Horst, D. (2018), Monetary natural capital assessment in the private sector: A review of current status and research needs.

[37] The Transparent Project's Natural Capital Accounting Methodology (NCMA) is a recent industry standard with input from a wide range of players. We believe this could position the NCMA as a 'standard of standards' in the current alphabet soup of competing methodologies; see Transparent Project et al (June 2023), *Standardized natural capital management accounting: A methodology for promoting the integration of nature in business decision making.*

[38] Brandon, C. et al (2021), *Integrating natural capital into national accounts: Three decades of promise and challenge.*

39 TNFD (2022), The LEAP Approach; Locate, Evaluate, Assess, and Prepare.

Sectors that significantly depend on natural capital such as mining and forestry stand to benefit the most from taking NCA seriously, so this creates a strong case for them to lead proof-of-concept NCA assessments (Box 4). The road testing of emerging national accounts would also create a link between end users and national statistical agencies, which should help to ensure accounts meet the needs of markets (Box 5).

Box 4: Case study: Holcim Spain's natural capital accounting approach towards quarries

Holcim Spain piloted innovative NCA methodologies for assessing ecosystem services at their quarries in 2021[40]. Holcim's work is particularly innovative for focusing on the business case for better national NCA, through their transparent corporate-driven assessment:

- **Critically highlighting the shortfalls of national data:** For instance, Holcim showed that Spain's biodiversity maps, produced in 2013, were not business-useful for quarry-level assessments at a 5km x 5km scale, creating a business case for better NCA data.
- **Joint initiative with the United Nations Statistical Division (UNSD):** Holcim undertook the pilot as part of a UNSD program, which meant their work had a detailed write up. This shares the pilot's experiences through an independent organization, helping prove NCA's business-relevance by adding credibility to the study and sending it to a wider audience. The detailed write-up is exactly why their work is included in this report.

[40] Lammerant, J. (2021), *Business and Natural Capital Accounting Case Study: Quarry restoration by Holcim, Spain*. United Nations Statistical Office.

Box 5: Case Study: EBRD's Natural Capital Valuation Model

The European Bank for Reconstruction and Development (EBRD) finances projects in three continents, exposing its balance sheet to many unalike nature-related risks that may be difficult to articulate with conventional financial tools. Addressing this blind spot, the EBRD commissioned Arcadis and partners to develop the Natural Capital Valuation (NCV) model. The NCV model identifies nature-related risks and investment opportunities within a particular landscape, translating them into economic terms using a standardized framework. It links to the recommendations of the Taskforce on Nature-related Financial Disclosures (TNFD) and the need to reflect nature-related risks in financial terms. The model demonstrates an innovative example of using NCA for several reasons:

- **Aligned with SEEA**: The model is built on SEEA's definitions and concepts, by spatially analyzing activities at the landscape scale and across multiple ecosystem types and services. Models like this could help behind-the-curve governments form their own accounts.
- **Multiple use cases**: The Bank is developing its use cases, such as evaluating the green credentials of potential nature-related risk management actions and investment projects. For instance, in a pilot study, the model suggested investments that raise water quality around the Aral Sea could generate value gains of around USD 4 million, through higher fish stocks. By articulating impact, trade-offs and more, the model helps normalize NCA as a tool for multilateral development banks.
- **Shortcomings of national data**: The model highlights the shortcomings of today's national environmental data. For instance, available data is typically country-level—while the model requires sub-national information—which is often fragmented, anecdotal, or linked to a specific project. The model sends a clear demand signal for national NCA accounts.

2. Provide data

National NCA requires all manner of data, on ecosystem state, pressures, as well as information to value assets and their services[41]. Businesses can act as providers of information, particularly in specialist business areas where they have access to valuation data (Box 6), or where they have undertaken their own assessments of habitat extent and condition (Box 7).

Care is needed. For instance, lots of data will carry legal restrictions or commercial sensitivity, particularly spatially-linked ecosystem data, which could link assets / practices to companies. However, the sheer volume of input data and estimations required for national NCA means businesses play a vital role in plugging information gaps ahead of wider nature KPI disclosures (e.g., TNFD) becoming a standardized norm.

Box 6: Zillow: providing land value data for US land accounts

Zillow, an American tech real-estate marketplace company, has access to land valuation data due to its position and activity in the real estate in the sector. It provided this data to the US government for its pilot land accounts, showing how bottom-up can support national NCA by providing proprietary data to statistical offices that is not available in the public domain[42].

---

[41] Such as market prices, shadow prices, and proxies.

[42] Wentland et al (2020), *Accounting for land in the United States: Integrating physical land cover, land use and monetary valuation.*

Box 7: Burt's Bees: Data on pollinators

Companies often have detailed datasets which could improve national NCA by plugging data gaps. For instance, Burt's Bees, a cosmetics and skin care business, is dependent on pollinators for the raw ingredients in their products. The company alongside partners managed this dependency by planting over 15 billion wildflower seeds, improving pollinator habitat over almost 60,000 hectares of farmland[43]. These exercises generate useful on-the-ground ecological data, which some have suggested could help refine the US's national pollinator accounts alongside other techniques[44].

3. Establish credibility

Two reasons undermine NCA's methodological credibility. The first is confusion about how NCA sits alongside other environmental assessment tools. For instance, governments use tools like life cycle assessments or productivity modelling, sometimes in combination, regularly or in one-off analyses, to measure the state of their impact on the environment. The sheer range creates problems for NCA, to the extent that policy makers reportedly struggle to understand how to combine NCA with existing methods[45].

The second reason is methodological challenges. Valuing nature on monetary terms is challenging, limiting NCA's use in mainstream accounting. It is likely this will ease as new tools and solutions emerge; for instance, the Capital Coalition's 'Value Commission' may prove critical in helping develop clear and transparent global criteria on the creation and use of value factors for us by businesses, governments, and financial institutions[46]. But for now, it universally slows NCA's use across the 'top' and the 'bottom'.

The 'bottom' can help here. Using NCA in analyses, even in the face of challenges, improves its methodological credibility, creating confidence around its use. It can tackle both the above issues respectively by:

- **Acting as an organizing framework for environmental analyses**: NCA isn't in competition with other methods because it is more an accounting framework rather than a measurement tool (Box 8). Instead, NCA requires other tools to measure and value nature via estimates and proxies.
- **Ironing out methodological creases:** Only by using NCA in practice can practical methodological issues be teased out, through what McKinsey terms an 'iterative test-learn-refine' approach. The top-down has proved cumbersome so far, and it is unlikely governments are agile enough to innovate on NCA.

---

[43] Burt's Bees (2021), *Sustainability Report.*

[44] Warnell, K. et al (2020), *Accounting for land in the United States: Integrating physical land cover, land use, and monetary valuation* as mentioned in Ingram, C. et al (2022), *Opportunities for businesses to use and support development of SEEA-aligned natural capital accounts.*

[45] Recuero Virto, L. et al (2018), *Natural capital accounts and public policy decisions: Findings from a survey.*

[46] See Capitals Coalition (undated), *The Value Commission.*

Box 8: Case study: BHP's targets

BHP, a diversified mining company, has a target to have 30% of land and water under its stewardship covered by either conservation, restoration, or regeneration practices by 2030.

As part of the commitment, BHP trialed the first natural capital accounting exercise in the mining sector. It helps provide a stronger case and evidence base for the target, because it revealed additional benefits that were previously unknown in relation to the rehabilitation design of a closed mineral sands site, such as improved water quality downstream of the site, and net carbon sequestration gains. The natural capital accounting case study showed that natural assets (water, carbon, biodiversity) and the ecosystem services they provide can be represented on a balance sheet, which could be used to inform decision-making[47].

4. Ensure future sustainability reporting is fit-for-purpose

Current sustainability reporting has well known problems. Some of these are general to reporting. For instance, few standardized metrics and data presented in unalike tables makes it hard to compare firms, even in the same industry. Similarly, sustainability disclosures rarely link sustainability information to financial reporting, making it hard to judge bottom-line materiality. Other issues are specific to nature disclosures: many firms report their impact on biodiversity through metrics like water consumption, but few report their dependence; even fewer report their positive impact on the environment.

Done right, NCA can iron out these issues. As an accounting framework, it forces information to be presented and organized in similar, monetized ways, putting sustainability impacts in a common language. This allows apples-to-apples comparisons of the tradeoffs between unalike sustainability impacts. Companies experimenting with Environmental Profit and Loss accounts provide insight on how sustainability reporting could look (Box 9 & Box 10).

Box 9: Case study: Sveaskog's net positive Integrated Profit & Loss

Sveaskog, the owner of 14% of Sweden's forests, commissioned GIST Impact to produce an Integrated P&L. The analysis estimated that its net positive natural capital impacts to be around seven times the firm's annual profits, largely because of the significant positive impact of carbon sequestration and water conservation services generated by the firm's forest assets[48].

[47] Meney, K et al (2023), *Natural capital accounting for the mining sector: Beenup site pilot case study.*

[48] GIST Advisory (2017), *Sveaskog Integrated Profit & Loss.*

Box 10: Case study: Forico's exemplary Environmental Profit & Loss

Forico, an Australian plantation forestry company, produced Natural Capital Reports with including a Natural Capital Balance Sheet and Environmental Profit & Loss for the financial years that ended in June 2020, 2021, and 2022. While a few companies have done these, what marks Forico apart from others is the leadership they have shown in setting future reporting expectations and their use of the information:

- The analysis was designed around SEEA EA and The Capital Coalitions' Natural Capital Protocol, clearly linking 'bottom-up' efforts to frameworks guiding 'top-down' national NCA.
- The company explicitly states that it intends to update and improve the reports over time as data sources, methodologies and standards evolve. Whilst Natural capital projects by corporates are often 'one-and-done' studies, mainstreaming NCA requires studies to be published in sync with financial reporting cycles, to generate regular data over time to study real-time impacts, dependencies, and trends to meaningfully influence decision making.
- The company is planning to set and report targets based on their natural capital accounts to guide future report iterations from 2023.

5. Innovate and standardize

Like all accountancy, NCA is neither a perfect science nor a finished product. Hidden in the detail are estimates, proxies and assumptions—all the ingredients that make reporting possible. SEEA even explicitly asks countries take their own initiative on NCA measurement and valuation based on local circumstances, inviting innovation.

The key difference between the two is that accountancy enjoys relatively standard methods for plugging gaps with estimates and assumptions, making comparison across financial reporting possible.

NCA does not have these standard tools yet[49]. The few NCA analyses done today use unalike methods and assumptions, even for similar studies done in the same sector, making reading across reports (peer comparison) impossible. Further, as practitioners innovate more on NCA, there is a danger that already unalike methods and assumptions diverge further, worsening the existing diffusion.

Some data intermediaries offer tools to plug these gaps (see Box 11). These allow cross-company comparisons in the absence of widespread corporate NCA (which generally takes three years from beginning work to disclosure), providing crucial stopgap solutions for financial institutions to value the impact of their downstream value chains. Ultimately, widespread and standardized corporate NCA is required to properly integrate nature into decision-making throughout the economy.

To tackle this, the bottom-up needs to continue innovating while promoting standardization by experimenting *within* standard accounting frameworks (Box 12). The effect would be to promote standardization in reporting without suffocating methodological innovation, taking NCA one step closer to becoming a mainstream framework.

[49] Notably there have been recent advances for companies to set Science-based Targets for Nature, with recent methodologies available for freshwater and land.

Box 11: Plugging gaps through intermediaries

Financial institutions require corporate NCA assessments to do their own NCAs, because their dependence on nature is through financial products. However, even if it popularized overnight, corporates generally take three years from beginning to disclosure to complete an NCA, limiting NCA's use in finance.

Addressing this gap, innovative 'intermediary' players like GIST Impact and S&P Trucost offer data and analytics to estimate the value of corporate environmental impacts. This helps 'get the ball moving' on financial sector impact valuation, allowing comparisons between firms today while possibly also motivating companies to do their own NCA to avoid their stakeholders relying on intermediaries to evaluate attractiveness.

For instance, United Parcel Service (UPS) is helping to plug methodology and data gaps by providing Small and Medium Businesses (SMBs) with a free environmental impact valuation tool, as part of a 'Green Exporters Program'[50]. The tool is in partnership with intermediaries, including GIST Impact (data and analytics) and ICC Certification (assurance). Large corporates are likely to adopt NCA first, making UPS' program novel for focusing on SMBs, in effect targeting the bottom-most of bottom-up organizations.

Box 12: Case study: Using Switzerland's Eco-points within an NCA framework

Firms can innovate within standard accounting frameworks by using existing tools to plug gaps.

For example, the Transparent Project's Natural Capital Account Methodology (NCMA)—a recent common corporate standard for NCA—provides companies with the flexibility to use their own initiative on data. Often data is not available on granular-enough scales for corporate-level NCA, requiring pragmatic shortcuts, such as using national averages instead.

Companies could use existing national environmental data in their NCA exercises, refining NCA methodologies within existing frameworks. An example is Switzerland's 'Eco-Factors', a set of officially-endorsed coefficients for calculating the net environmental impact of a wide range of economic activities[51]. The Eco-Factors can plug into a wide range of NCA analyses, and due to their government origin they are likely to be seen as credible shortcuts before better data emerges—facilitating standardized NCA today while sending signals of demand for national NCA data.

[50] UPS (2023), *UPS is supporting a greener supply chain.*

[51] FOEN (2021), *Swiss Eco-Factors 2021 according to the ecological scarcity method.*

3.4. The road ahead

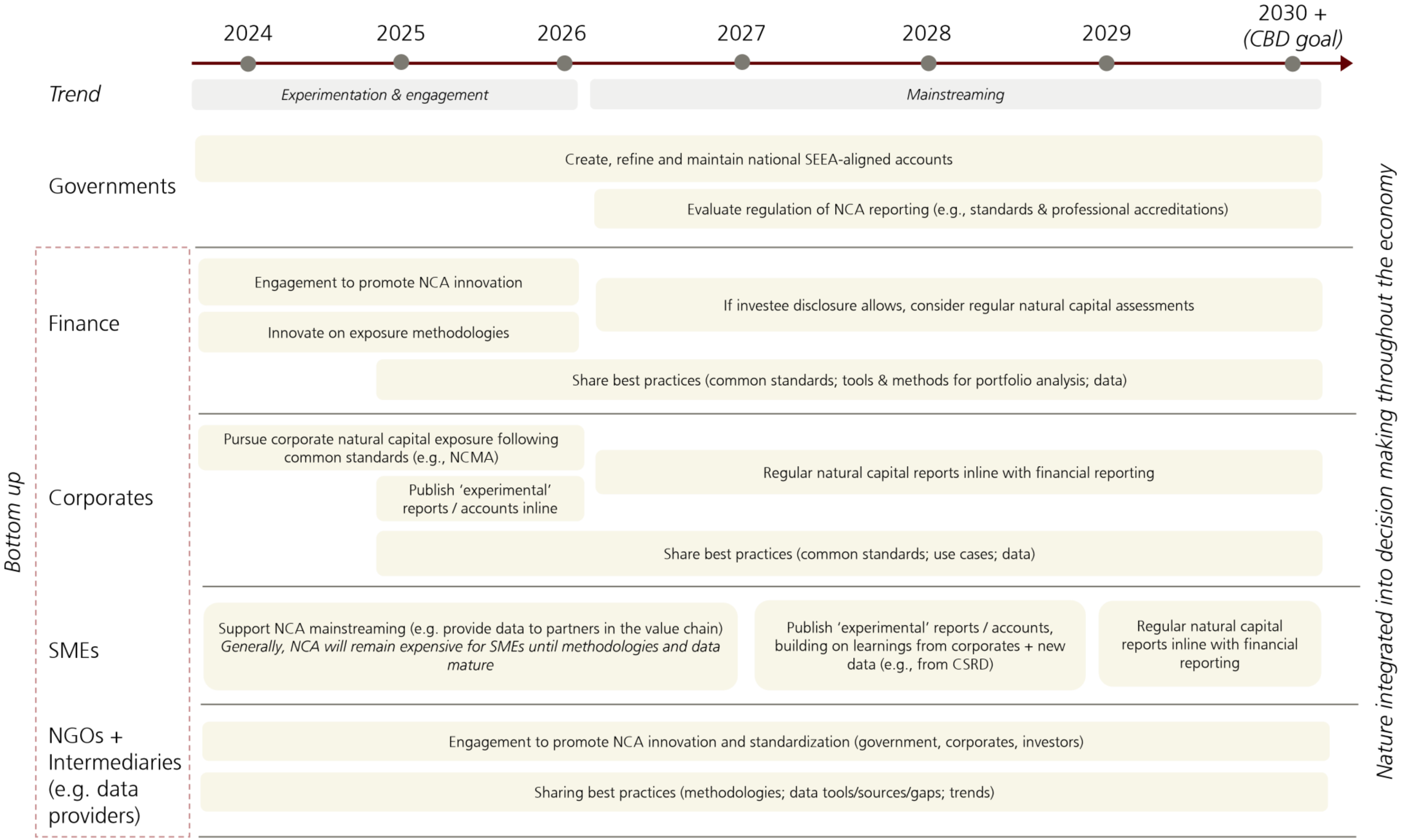
Taking these strategies forward, an idealized path to mainstream NCA involves key actions across corporates, investors, NGOs and governments (Figure 4):

- **Corporates and SMEs** proactively experiment and publish NCA assessments (which takes about three years from start to disclosure), laying the groundwork for regular and standardized reporting closer to 2030;
- **Finance** supports companies in their efforts to use NCA while performing their own assessments—possibly drawing upon data intermediaries to assist prior regular, comparable and widespread investee disclosures taking off;
- **NGOs and Intermediaries** play a facilitatory role as they do today, engaging with all actors and to promote best practice, share learnings and provide stopgap solutions;
- **Governments** continue to implement and create SEEA-aligned accounts (likely beyond 2030, given the US's 2035 deadline) and consider regulatory needs if regular NCA takes off at the corporate level.

[to see **Figure 4** please go to the next page]

Figure 4. Idealized path to mainstreaming NCA, involving corporates, finance, NGOs, and governments.

The below represents a 'best case' roadmap. In reality, the road may be bumpier, as corporates and financial firms continue firming up nature KPI reporting until the mid- to late-2020s—a necessary precursor to bottom-up NCA—pushing widespread NCA reporting beyond 2030.



Source: UBS.

4. Summing up

The world does not have the luxury of time. With just seven years left, the CBD's 2030 goal seems increasingly optimistic.

If we are to have any hope of meeting this deadline, or at least coming close, we need to integrate the value of nature into the decision-making throughout the economy.

Natural capital accounting offers a potential solution, but top-down efforts to date have been too slow to develop at scale, generating little if any impact. The core message of this paper is that NCA will only work if private sector organizations—investors, corporates, NGOs, and others—work proactively to incorporate it into their accounting efforts and find ways to bypass its current weaknesses.

There are three key takeaways:

- **Don't wait for NCA to emerge.** After almost six decades of development, the framework remains too niche to meaningfully contribute to the CBD's 2030 goal. Players at the bottom need to develop NCA's nascent methods and data, as they normalize its use.
- **Promote best-practice.** We don't just need more NCA, we need better NCA. The best way to promote this is to use common standards while sharing best practices.
- **Meet top-down efforts in the middle.** Top-down efforts to create SEEA-aligned accounts remain crucial for mainstreaming NCA. But bottom-up work can help to prove the business case for it today, which would help to speed up this process and ensure future accounts are fit-for-purpose.

NCA is a diagnosis rather than a cure for biodiversity loss. But by ensuring that financial decision-making across the economy properly values nature, NCA can arm governments, NGOs, multilateral institutions, and corporates with the data they need to develop countermeasures.

About the Institute

The UBS Sustainability and Impact Institute was founded in 2021 to contribute to the sustainability debate, with a focus on actionable and timely contributions. The Institute is a collaborative effort with sustainability experts from across UBS's business divisions. We strive to encourage objective and fact-based debate, provide new impulses for action, and identify innovations that will help shape our collective efforts and awareness about sustainability and impact.

Fellows of the Institute

Jackie Bauer
Francis Condon
Gillian Dexter
Paul Donovan
Adam Gustafsson
Vicki Kalb
Karianne Lancee
Andrew Lee
Stevica Levajkovski
Richard Morrow
Grégorie Muhr
Richard Mylles
William Nicolle
Stephanie Oesch
Mike Ryan
Antonia Sariyska
Nalini Tarakeshwar
Veronica Weisser
Annabel Willder
Maya Ziswiler

Disclaimer

Important Information: This material has been prepared by UBS AG, its subsidiary or affiliate ("UBS"). This material and the information contained herein are provided solely **for information purposes**. It is not to be regarded as investment advice, investment research, sales prospectus, an offer or a solicitation of an offer to enter in any investment activity. It has no regard to the specific investment objectives, financial situation or particular needs of any specific recipient. The information contained in this material is as of the date hereof only and is subject to change without notice. UBS is under no obligation to update or keep current the information contained herein. This material is not a complete statement of the markets and developments referred to herein. The information contained herein should not be regarded by recipients as a substitute for the exercise of their own judgment. Prior to entering into a transaction you should consult with your own legal, regulatory, tax, financial and accounting advisers to the extent you deem necessary to make your own investment, hedging and trading decisions. UBS does not provide legal or tax advice and makes no representations as to the tax treatment of assets or the investment returns thereon, either in general or with reference to specific client's circumstances and needs. Certain services and products are subject to legal provisions and cannot be offered world-wide on an unrestricted basis. In particular, this material is not intended for distribution into jurisdictions where its distribution by UBS would be restricted. UBS specifically prohibits the redistribution or reproduction of this material in whole or in part without the written permission of UBS and UBS accepts no liability whatsoever for the actions of third parties in this respect. Neither UBS nor any of its directors, officers, employees or agents accepts any liability for any loss or damage arising out of the use of all or any part of this material. Source of all information is UBS unless otherwise stated. UBS makes no representation or warranty relating to any information herein which is derived from independent sources. The views and opinions expressed in this material by third parties are not those of UBS. Accordingly, UBS does not accept any liability over the content shared by third parties or any claims, losses or damages arising from the use or reliance of all or any part thereof.

Important Information About Sustainable Investing: An increasing number of products and services are using terms or labels related to sustainable investments. However, industry standards and terminology related to sustainable investments will differ and are evolving. Therefore, you should carefully review the offering materials to understand why a particular product or strategy may or may not be classified as a sustainable investment and if their approach aligns with your goals and objectives. At UBS, we continue to develop our own standards and a framework for sustainable investing. However we do not review every product to determine consistency with our standards, nor do all products that we make available align with our approach.

At UBS, we believe sustainable investment strategies should have an explicit focus on sustainability objectives or outcomes. Sustainable investments across geographies and styles approach the integration of environmental, social and governance (ESG) factors and other sustainability considerations and incorporate the findings in a variety of ways. Sustainable investing-related strategies may or may not result in favorable investment performance and the strategy may forego favorable market opportunities in order to adhere to sustainable investing-related strategies or mandates. Issuers may not necessarily meet high performance standards on all aspects of ESG or other sustainability considerations. In addition, there is no guarantee that a product's sustainable investing-related strategy will be successful. The ability to implement the approaches to sustainable investing will depend on the product or service selected, they are not available for all products, services or accounts offered through UBS.

Bahrain: UBS is a Swiss bank not licensed, supervised or regulated in Bahrain by the Central Bank of Bahrain to undertake banking or investment business activities in Bahrain. Therefore, prospects/clients do not have any protection under local banking and investment services laws and regulations. **Brazil:** This publication is only intended for Brazilian residents who are directly purchasing or selling securities in the Brazil capital market through a local authorized institution. **Canada:** The information contained herein is not, and under no circumstances is to be construed as, a prospectus, an advertisement, a public offering, an offer to sell securities described herein, solicitation of an offer to buy securities described herein, in Canada or any province or territory thereof. Any offer or sale of the securities described herein in Canada will be made only under an exemption from the requirements to file a prospectus with the relevant Canadian securities regulators and only by a dealer properly registered under applicable securities laws or, alternatively, pursuant to an exemption from the dealer registration requirement in the relevant province or territory of Canada in which such offer or sale is made. Under no circumstances is the information contained herein to be construed as investment advice in any province or territory of Canada and is not tailored to the needs of the recipient. To the extent that the information contained herein references securities of an issuer incorporated, formed or created under the laws of Canada or a province or territory of Canada, any trades in such securities must be conducted through a dealer registered in Canada or, alternatively, pursuant to a dealer registration exemption. No securities commission or similar regulatory authority in Canada has reviewed or in any way passed upon these materials, the information contained herein or the merits of the securities described herein and any representation to the contrary is an offence. In Canada, this publication is distributed by UBS Investment Management Canada Inc..
China: This document and any offering material such as term sheet, research report, other product or service documentation or any other information (the "Material") sent with this document was done so as a result of a request received by UBS from you and/or persons entitled

to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete it and inform UBS immediately. This document is prepared by UBS Switzerland AG or its offshore subsidiary or affiliate (collectively as "UBS Offshore"). UBS Offshore is an entity incorporated out of China and is not licensed, supervised or regulated in China to carry out banking or securities business. The recipient should not contact UBS Offshore or authors who produced this report for advice as they are not licensed to provide securities investment advice in China. The recipient should not use this document or otherwise rely on any of the information contained in this document in making investment decisions and UBS takes no responsibility in this regard. **Czech Republic:** UBS is not a licensed bank in the Czech Republic and thus is not allowed to provide regulated banking or investment services in the Czech Republic. This communication and/or material is distributed for marketing purposes and constitutes a "Commercial Message" under the laws of the Czech Republic in relation to banking and/or investment services. Please notify UBS if you do not wish to receive any further correspondence.

Denmark: This publication is not intended to constitute a public offer under Danish law. It is distributed only for information purposes to clients of UBS Europe SE, Denmark Branch, filial af UBS Europe SE, with place of business at Sankt Annae Plads 13, 1250 Copenhagen, Denmark, registered with the Danish Commerce and Companies Agency, under No. 38 17 24 33. UBS Europe SE, Denmark Branch, filial af UBS Europe SE is subject to the joint supervision of the European Central Bank, the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, "BaFin"), as well as of the Danish Financial Supervisory Authority (Finanstilsynet), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by BaFin. **Egypt:** Securities or other investment products are not being offered or sold by UBS to the public in Egypt and they have not been and will not be registered with the Egyptian Financial Regulatory Authority (FRA). **France:** This publication is not intended to constitute a public offer under French law, it does not constitute a personal recommendation as it is distributed only for information purposes to clients of UBS (France) S.A., French "société anonyme" with share capital of € 132.975.556, at 69 boulevard Haussmann F-75008 Paris, registered with the "Registre du Commerce et des Sociétés" of Paris under N° B 421 255 670. UBS (France) S.A. is a provider of investment services duly authorized according to the terms of the "Code monétaire et financier", regulated by French banking and financial authorities as the "Autorité de contrôle prudentiel et de résolution" and "Autorité des marchés financiers", to which this publication has not been submitted for approval.

Germany: This publication is not intended to constitute a public offer under German law. It is distributed only for information purposes to clients of UBS Europe SE, Germany, with place of business at Bockenheimer Landstrasse 2-4, 60306 Frankfurt am Main. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, "BaFin") and supervised jointly by the European Central Bank, the German Central Bank (Deutsche Bundesbank) and the BaFin, to which this publication has not been submitted for approval.

Hong Kong SAR: This publication is distributed to clients of UBS AG Hong Kong Branch by UBS AG Hong Kong Branch, a licensed bank under the Hong Kong Banking Ordinance and a registered institution under the Securities and Futures Ordinance. UBS AG Hong Kong Branch is incorporated in Switzerland with limited liability. **India:** Distributed by UBS Securities India Private Ltd. (Corporate Identity Number U67120MH1996PTC097299) 2/F, 2 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra (East), Mumbai (India) 400051. Phone: +912261556000. It provides brokerage services bearing SEBI Registration Number INZ000259830; merchant banking services bearing SEBI Registration Number: INM000010809 and Research Analyst services bearing SEBI Registration Number: INH000001204. UBS AG, its affiliates or subsidiaries may have debt holdings or positions in the subject Indian company/companies. UBS AG, its affiliates or subsidiaries may have financial interests (e.g. like loan/derivative products, rights to or interests in investments, etc.) in the subject Indian company/companies from time to time. Within the past 12 months, UBS AG, its affiliates or subsidiaries may have received compensation for non-investment banking securities-related services and/or non-securities services from the subject Indian company/companies. The subject company/companies may have been a client/clients of UBS AG, its affiliates or subsidiaries during the 12 months preceding the date of distribution of this publication with respect to investment banking and/or non-investment banking securities-related services and/or non-securities services. With regard to information on associates, please refer to the Annual Report at: http://www.ubs.com/global/en/about_ubs/investor_relations/annualreporting.html. **Indonesia:** This communication and any offering material term sheet, research report, other product or service documentation or any other information (the "Material") sent with this communication was done so as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete the e-mail and inform UBS immediately. The Material, where provided, was provided for your information only and is not to be further distributed without the consent of UBS. None of the Material has been registered or filed under the prevailing laws and with any financial or regulatory authority in your jurisdiction. The Material may not have been approved, disapproved, endorsed, registered or filed with any financial or regulatory authority in your jurisdiction. UBS has not, by virtue of the Material, made available, issued any invitation to subscribe for or to purchase any investment (including securities or products or futures contracts). The Material is neither an offer nor a solicitation to enter into any transaction or contract (including futures contracts) nor is it an offer to buy or to sell any securities or products. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the Material, and by receiving the Material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. Any and all advice provided on and/or trades executed by UBS pursuant to the Material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. **Israel:** UBS is a premier global financial firm offering wealth management, asset management and investment banking services from its headquarters in Switzerland and its operations in over 50 countries worldwide to individual, corporate and institutional investors. In Israel, UBS Switzerland AG is registered as Foreign Dealer in cooperation with UBS Wealth Management Israel Ltd., a wholly owned UBS subsidiary. UBS Wealth Management Israel Ltd. is an Investment Marketing licensee which engages in Investment Marketing and is regulated by the Israel Securities Authority. This publication is intended for information only and is not intended as an offer to buy or solicitation of an offer. Furthermore, this publication is not intended as an investment advice. No action has been, or will be, taken in Israel that would permit an offering of the product(s) mentioned in this document or a distribution of this document to the public in Israel. In particular, this document has not been reviewed or approved by the Israeli Securities Authority. The product(s) mentioned in this document is/are being offered to a limited number of sophisticated investors who qualify as one of the investors listed in the first supplement to the Israeli Securities Law, 5728-1968. This document may not be reproduced or used for any other purpose, nor be furnished to any other person other than those to whom copies have been sent. Anyone who purchases the product(s) mentioned herein shall do so for its own benefit and for its own account and not with the aim or intention of distributing or offering the product(s) to other parties. Anyone who purchases the product(s) shall do so in accordance with its own understanding and discretion and after it has received any relevant financial, legal, business, tax or other advice or opinion required by it in connection with such purchase(s). The word "advice" and/or any of its equivalent terms shall be read and construed in conjunction with the definition of the term "investment marketing" as defined under the Israeli Regulation of Investment Advice, Investment Marketing and Portfolio Management Law. **Italy:** This publication is not intended to constitute a public offer under Italian law. It is distributed only for information purposes to clients of UBS Europe SE, Succursale Italia, with place of business at Via del Vecchio Politecnico, 3-20121 Milano. UBS Europe SE, Succursale Italia is subject to the joint supervision of the European Central Bank, the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, "BaFin"), as well as of the Bank of Italy (Banca d'Italia) and the Italian Financial Markets Supervisory Authority (CONSOB—Commissione Nazionale per le Società e la Borsa), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by BaFin. **Jersey:** UBS AG, Jersey Branch, is regulated and authorized by the Jersey Financial Services Commission for the conduct of banking, funds and investment business. Where services are provided from outside Jersey, they will not be covered by the Jersey regulatory regime. UBS AG, Jersey Branch is a branch of UBS AG a public company limited by shares, incorporated in Switzerland whose registered offices are at Aeschenvorstadt 1, CH-4051 Basel and Bahnhofstrasse 45, CH 8001 Zurich. UBS AG, Jersey Branch's principal place of business is 1, IFC Jersey, St Helier, Jersey, JE2 3BX. **Luxembourg**: This publication is not intended to constitute a public offer under Luxembourg law. It is distributed only for information purposes to clients of UBS Europe SE, Luxembourg Branch ("UBS Luxembourg"), R.C.S. Luxembourg n° B209123, with registered office at 33A, Avenue J. F. Kennedy, L-1855 Luxembourg. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea (HRB n° 107046), with registered office at Bockenheimer Landstrasse 2-4, D-60306 Frankfurt am Main, Germany, duly authorized by the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, "BaFin") and subject to the joint prudential supervision of BaFin, the European Central Bank and the central bank of Germany (Deutsche Bundesbank). UBS Luxembourg is furthermore supervised by the Luxembourg prudential supervisory authority (Commission de Surveillance du Secteur Financier), in its role as host member state authority. This publication has not been submitted for approval to any public supervisory authority. **Malaysia:** This communication and any offering material term sheet, research report, other product or service documentation or any other information (the "Material") sent with this communication was done so as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete the e-mail and inform UBS immediately. The Material, where provided, was provided for your information only and is not to be further distributed in whole or in part in or into your jurisdiction without the consent of UBS. The Material may not have been reviewed, approved, disapproved, endorsed, registered or filed with any financial or regulatory authority in your jurisdiction. UBS has not, by virtue of the Material, made available, issued any invitation to subscribe for or to purchase any investment (including securities or derivatives products). The Material is neither an offer nor a solicitation to enter into any transaction or contract (including future contracts) nor is it an offer to buy or to sell any securities or derivatives products. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the Material, and by receiving the Material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. Any and all advice provided on and/or trades executed by UBS pursuant to the Material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. **Mexico:** This information is distributed by UBS Asesores México, S.A. de C.V. ("UBS Asesores"), an affiliate of UBS Switzerland AG, incorporated as a non-independent investment advisor under the Mexican regulation due to the relation with a Foreign Bank. UBS Asesores is registered under number 30060-001-(14115)-21/06/2016 and subject to the supervision of the Mexican Banking and Securities Commission ("CNBV") exclusively regarding the rendering of (i) portfolio management services, (ii) securities investment advisory services, analysis and issuance of individual investment recommendations, and (iii) anti-money laundering and terrorism financing matters. Such registry does not imply the adherence of UBS Asesores to the regulations applicable to the services it provides, nor the accuracy or veracity of the information provided to its clients. This UBS publication or any material related thereto is addressed only to Sophisticated or Institutional Investors located in Mexico. **Monaco:** This document is not intended to constitute a public offering or a comparable solicitation under the Principality of Monaco laws, but might be made available for information purposes to clients of UBS (Monaco) SA, a regulated bank having its registered office 2 avenue de Grande Bretagne 98000 Monaco operating under a banking license granted by the "Autorité de Contrôle Prudentiel et de Résolution" (ACPR) and the Monegasque government which authorizes the provision of banking services in Monaco. UBS (Monaco) S.A. is also licensed by the "Commission de Contrôle des Activités Financières" (CCAF) to provide investment services in Monaco. The latter has not approved this publication. **Nigeria:** The investment products mentioned in this material are not being offered or sold by UBS to the public in Nigeria and they have not been submitted for approval nor registered with the Securities and Exchange Commission of Nigeria. If you are interested in products of this nature, please let us know. The investment products mentioned in this material are not being directed to, and are not being made available for subscription by any persons within Nigeria other than the selected investors to whom the offer materials have been addressed as a private sale or domestic concern within the exemption and meaning of Section 69(2) of the Investments and Securities Act, 2007 (ISA). This material has been provided to you at your specific unsolicited request and for your information only. **Philippines:** This communication was done so as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete the e-mail and inform UBS immediately. The Material, where provided, was provided for your information only and is not to be further distributed in whole or in part in or into your jurisdiction without the consent of UBS. The Material may not have been reviewed, approved, disapproved, endorsed, registered or filed with any financial or regulatory authority in your jurisdiction. UBS has not, by virtue of the Material, made available, issued any invitation to subscribe for or to purchase any investment (including securities or derivatives products). The Material is neither an offer nor a solicitation to enter into any transaction or contract (including future contracts) nor is it an offer to buy or to sell any securities or derivatives products. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the Material, and by receiving the Material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. Any and all advice provided on and/or trades executed by UBS pursuant to the Material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. **Portugal:** UBS Switzerland AG is not licensed to conduct banking and financial activities in Portugal nor is UBS Switzerland AG supervised by the portuguese regulators (Bank of Portugal "Banco de Portugal" and Portuguese Securities Exchange Commission "Comissão do Mercado de Valores Mobiliários"). **Qatar:** UBS Qatar LLC is authorized by the Qatar Financial Centre Regulatory Authority, with QFC no. 01169, and has its registered office at 14th Floor, Burj Alfardan Tower, Building 157, Street No. 301, Area No. 69, Al Majdami, Lusail, Qatar. UBS Qatar LLC neither offers any brokerage services nor executes any order with, for or on behalf of its clients. A client order will have to be placed with, and executed by, UBS Switzerland AG in Switzerland or an affiliate of UBS Switzerland AG, that is domiciled outside Qatar. It is in the sole discretion of UBS Switzerland AG in Switzerland or its affiliate to accept or reject an order and UBS Qatar LLC does not have authority to provide a confirmation in this respect. UBS Qatar LLC may however communicate payment orders and investment instructions to UBS Switzerland AG in Switzerland for receipt, acceptance and execution. UBS Qatar LLC is not authorized to act for and on behalf of UBS Switzerland AG or an affiliate of UBS Switzerland AG. This document and any attachments hereto are intended for eligible counterparties and business customers only. **Russia:** This document or information contained therein is for information purposes only and constitutes neither a public nor a private offering, is not an invitation to make offers, to sell, exchange or otherwise transfer any financial instruments in the Russian Federation to or for the benefit of any Russian person or entity and does not constitute an advertisement or offering of securities in the Russian Federation within the meaning of Russian securities laws. The information contained herein is not an "individual investment recommendation as defined in Federal Law of 22 April 1996 No 39-FZ "On Securities Market" (as amended) and the financial instruments and operations specified herein may not be suitable for your investment profile or your investment goals or expectations. The determination of whether or not such financial instruments and operations are in your interests or are suitable for your investment goals, investment horizon or the acceptable risk level is your responsibility. We assume no liability for any losses connected with making any such operations or investing into any such financial instruments and we do not recommend to use such information as the only source of information for making an investment decision. **Saudi Arabia:** UBS Saudi Arabia is authorised and regulated by the Capital Market Authority to conduct securities business under licence number 08113-37. **Singapore:** Clients of UBS AG Singapore branch are asked to please contact UBS AG Singapore branch, an exempt financial adviser under the Singapore Financial Advisers Act (Cap. 110) and a wholesale bank licensed under the Singapore Banking Act (Cap. 19) regulated by the Monetary Authority of Singapore, in respect of any matters arising from, or in connection with, the analysis or report. UBS AG is incorporated in Switzerland with limited liability. UBS AG has a branch registered in Singapore (UEN S98FC5560C). This communication and any offering material term sheet, research report, other product or service documentation or any other information (the "Material") sent with this communication was done so as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete the e-mail and inform UBS immediately. The Material, where provided, was provided for your information only and is not to be further distributed in whole or in part in or into your jurisdiction without the consent of UBS. The Material may not have been reviewed, approved, disapproved or endorsed by any financial or regulatory authority in your jurisdiction. UBS has not, by virtue of the Material, made available, issued any invitation to subscribe for or to purchase any investment (including securities or products or futures contracts). The Material is neither an offer nor a solicitation to enter into any transaction or contract (including future contracts) nor is it an offer to buy or to sell any securities or products. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the Material, and by receiving the Material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. Any and all advice provided on and/or trades executed by UBS pursuant to the Material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. **Sweden:** This publication is not intended to constitute a public offer under Swedish law. It is distributed only for information purposes to clients of UBS Europe SE, Sweden Bankfilial, with place of business at Regeringsgatan 38, 11153 Stockholm, Sweden, registered with the Swedish Companies Registration Office under Reg. No 516406-1011. UBS Europe SE, Sweden Bankfilial is subject to the joint supervision of the European Central Bank, the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, "BaFin"), as well as of the Swedish supervisory authority (Finansinspektionen), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by BaFin. **Taiwan:** This material is provided by UBS AG, Taipei Branch in accordance with laws of Taiwan, in agreement with or at the request of clients/prospects. **Thailand:** This communication and any offering material, term sheet, research report, other product or service documentation or any other information (the "Material") sent with this communication were done so as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the Material erroneously, UBS asks that you kindly delete the e-mail and inform UBS immediately. The Material, where provided, was provided for your information only and is not to be further distributed in whole or in part in or into your jurisdiction without the consent of UBS. The Material may not have been reviewed, approved, disapproved, endorsed, registered or filed with any financial or regulatory authority in your jurisdiction. UBS has not, by virtue of the Material, made available, issued any invitation to subscribe for or to purchase any investment (including securities or derivatives products). The Material is neither an offer nor a solicitation to enter into any transaction or contract (including future contracts) nor is it an offer to buy or to sell any securities or derivatives products. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the Material, and by receiving the

Material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. Any and all advice provided and/or trades executed by UBS pursuant to the Material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. **Turkey:** The information in this document is not provided for the purpose of offering, marketing or sale of any capital market instrument or service in the Republic of Turkey. Therefore, this document may not be considered as an offer made, or to be made, to residents of the Republic of Turkey in the Republic of Turkey. UBS Switzerland AG is not licensed by the Turkish Capital Market Board (the CMB) under the provisions of the Capital Market Law (Law No. 6362). Accordingly, neither this document nor any other offering material related to the instrument/service may be utilized in connection with providing any capital market services to persons within the Republic of Turkey without the prior approval of the CMB. However, according to article 15 (d) (ii) of the Decree No. 32 residents of the Republic of Turkey are allowed to purchase or sell the financial instruments traded in financial markets outside of the Republic of Turkey. Further to this, pursuant to article 9 of the Communiqué on Principles Regarding Investment Services, Activities and Ancillary Services No. III-37.1, investment services provided abroad to residents of the Republic of Turkey based on their own initiative are not restricted. **United Arab Emirates (UAE):** UBS is not a financial institution licensed in the UAE by the Central Bank of the UAE nor by the Emirates' Securities and Commodities Authority and does not undertake banking activities in the UAE. UBS AG Dubai Branch is licensed by the DFSA in the DIFC. This document is provided for your information only and does not constitute financial advice. **United Kingdom:** This document is issued by UBS Wealth Management, a division of UBS AG which is authorised and regulated by the Financial Market Supervisory Authority in Switzerland. In the United Kingdom, UBS AG is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. Details about the extent of regulation by the Prudential Regulation Authority are available from us on request. A member of the London Stock Exchange. This publication is distributed to retail clients of UBS Wealth Management. Where products or services are provided from outside the UK, they will not be covered by the UK regulatory regime or the Financial Services Compensation Scheme. **Ukraine**: UBS is not registered and licensed as a bank/financial institution under Ukrainian legislation and does not provide banking and other financial services in Ukraine. UBS has not made and will not make any offer of the mentioned products to the public in Ukraine. No action has been taken to authorize an offer of the mentioned products to the public in Ukraine and the distribution of this document shall not constitute financial services for the purposes of the Law of Ukraine "On Financial Services and State Regulation of Financial Services Markets" dated 12 July 2001. Any offer of the mentioned products shall not constitute an investment advice, public offer, circulation, transfer, safekeeping, holding or custody of securities in the territory of Ukraine. Accordingly, nothing in this document or any other document, information or communication related to the mentioned products shall be interpreted as containing an offer, a public offer or invitation to offer or to a public offer, or solicitation of securities in the territory of Ukraine or investment advice under Ukrainian law. Electronic communication must not be considered as an offer to enter into an electronic agreement or other electronic instrument within the meaning of the Law of Ukraine "On Electronic Commerce" dated 3 September 2015. This document is strictly for private use by its holder and may not be passed on to third parties or otherwise publicly distributed. **USA**: **:** As a firm providing wealth management services to clients, UBS Financial Services Inc. offers investment advisory services in its capacity as an SEC-registered investment adviser and brokerage services in its capacity as an SEC-registered broker-dealer. Investment advisory services and brokerage services are separate and distinct, differ in material ways and are governed by different laws and separate arrangements. It is important that you understand the ways in which we conduct business and that you carefully read the agreements and disclosures that we provide about the products or services we offer. For more information, please review client relationship summary provided at ubs.com/relationshipsummary. There are two sources of UBS research. Reports from the first source, UBS CIO Wealth Management Research, are designed for individual investors and are produced by UBS Wealth Management Americas (which includes UBS Financial Services Inc. and UBS International Inc.) and UBS Wealth Management. The second research source is UBS Investment Research, and its reports are produced by UBS Investment Bank, whose primary business focus is institutional investors. The two sources operate independently and may therefore have different recommendations. The various research content provided does not take into account the unique investment objectives, financial situation or particular needs of any specific individual investor. This material is not independent research and not subject to regulatory rules regarding research in the US. This material is intended for educational purposes only. If you have any questions, please consult your Financial Advisor. UBS Financial Services Inc. is a subsidiary of UBS Group AG and an affiliate of UBS International Inc.

Approval Date: 7/21/2023

Expiration: 7/31/2024

Review Code: IS2304477

www.ubs.com

UBS