

# Biodiversity Credit Calculation Overview

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 [sgradeckas.substack.com/p/biodiversity-credit-calculation-overview](https://sgradeckas.substack.com/p/biodiversity-credit-calculation-overview)

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Hi folks 🙌

For those who don't know me, I'm Simas from [Bloom Labs](#) - a biodiversity finance newsletter & consultancy. I focus on all things biodiversity markets, nature accounting & biodiversity measurement, reporting and verification (MRV).

Cheers!

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One of the most frequent questions I get is “how are biodiversity credits calculated?”. That's why I dug deep into all the indicators and metrics included into credit calculation by every biodiversity credit scheme I could find (here's a detailed [list](#) of them I made earlier).

This research is meant to help folks understand the biodiversity credit calculation landscape at a high level. That's why I won't get into formula-level calculations (this time 😊).

**Here's the end result: a list of all the biodiversity credit calculation indicators (and some metrics), grouped by each scheme.**

## Disclaimers

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As always, before I start, a couple of disclaimers:

Firstly, this is just an overview of the different indicators taken into account for credit calculation by different biodiversity credit schemes. It says nothing about the quality of any. Additional factors like scientific rigor, community focus, feasibility or scalability are not easily visualized or quantified - that's why I excluded them (for now).

And secondly, not everything is 100% accurate. I've omitted parts I considered less important, made assumptions when lacking information and recategorized some metrics to create a clearer picture.

## Context on categorization

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At this point, there's more confusion than clarity in the biodiversity markets. My goal is to bring more clarity. Doing that inevitably means making some arbitrary choices. So, let me share a couple of them:

## Why the species, habitat and ecosystem buckets?

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I've decided to categorize both schemes and their indicators/metrics into species, habitat and ecosystem (+ misc) buckets since I haven't yet found a cleaner way to differentiate them within the biodiversity credit context. Some other organizations promote only using the species and ecosystem categories though. This categorization focuses on scale-level differentiation: from the most granular (species) to the most high-level (ecosystem).

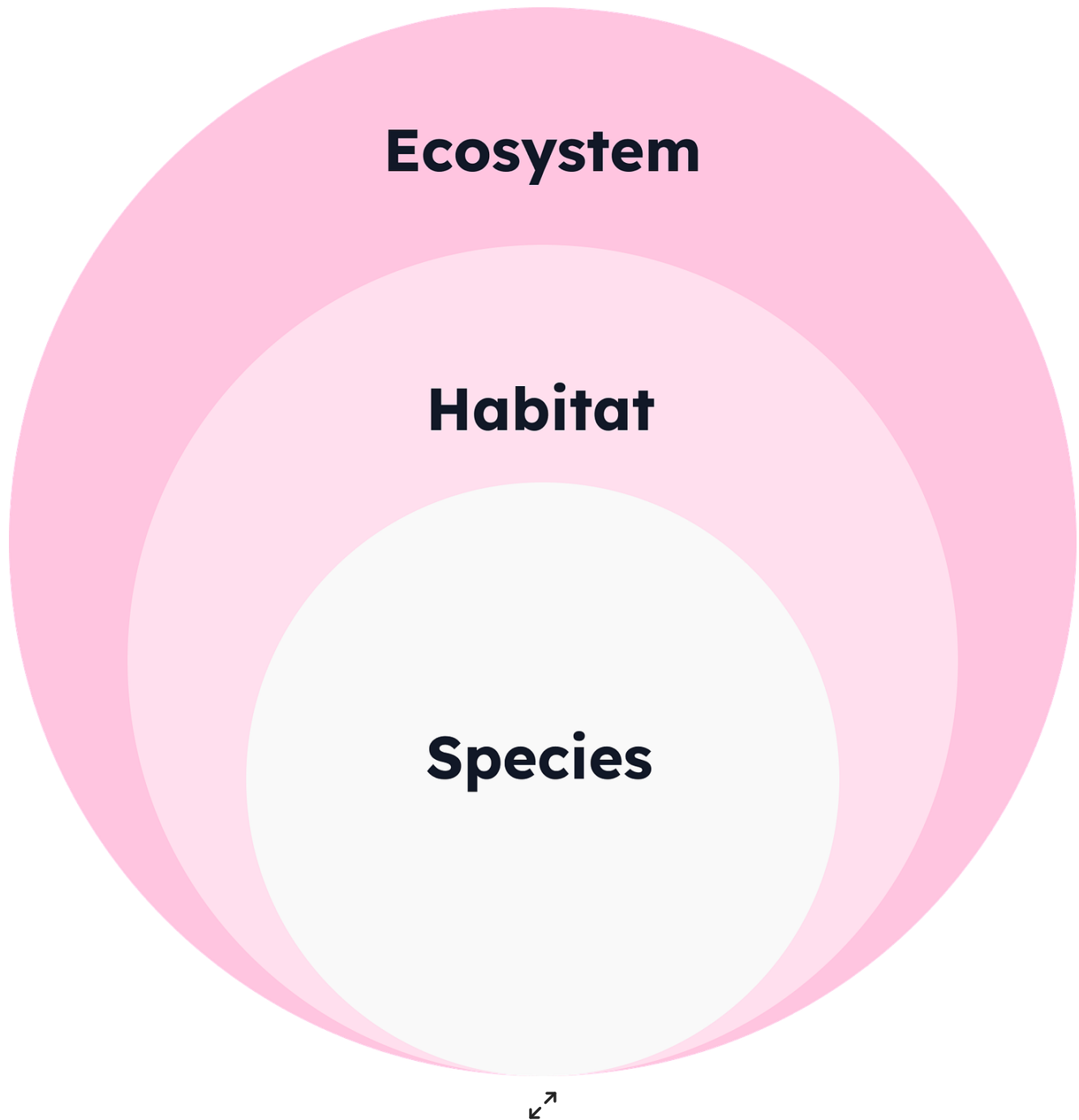


Figure 1: At the end of the day, everything starts with species, the atomic unit of life on Earth.

## Habitat and ecosystem buckets: what's the difference?

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I found myself asking this question a lot. These terms are often used interchangeably by the biodiversity credit schemes themselves and are definitely overlapping (especially around habitat/ecosystem condition and connectivity). There are a couple of differences I prioritized though: scale and focus. Ecosystems are usually larger in size and focus more on the high-level interactions between living and non-living elements while habitats are more concerned with specific habitat types, structure and condition.

### **Metrics, indicators, credits and schemes: what's the difference?**

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All of these could sometimes be used interchangeably. I've separated them according to scale (again), from the highest level to the lowest:

- *Schemes*: biodiversity credit standards/methodologies that determine the scope of its biodiversity credit units.
- *Credits*: the biodiversity uplift/avoided loss units that integrate (usually) multiple indicators into their calculation.
- *Indicators*: the biodiversity areas of interest that the schemes are tracking using (usually) multiple metrics (e.g. species richness, habitat distinctiveness, food web complexity, etc.).
- *Metrics*: specific indices/values used to calculate one of the biodiversity indicators (e.g. Margalef index of diversity, habitat distinctiveness category, CreditNature Trophic Function metric, etc.).

## **Findings**

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### **It's all interrelated**

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Species, habitat and ecosystem level indicators are all deeply interrelated. Many credit schemes use metrics from different categories and some of them even fall into multiple categories. After all, every scheme has the same goal: preserve or restore conditions for life.

### **Most schemes are habitat-based**

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The majority of the methodologies orbit around the habitat level. Some tell-tale signs are heavy focus on the land size, habitat structure, condition & connectivity indicators. There are only a couple that have a strong, virtually species-only focus. And most institutionally established schemes are focused on the ecosystem level biodiversity.

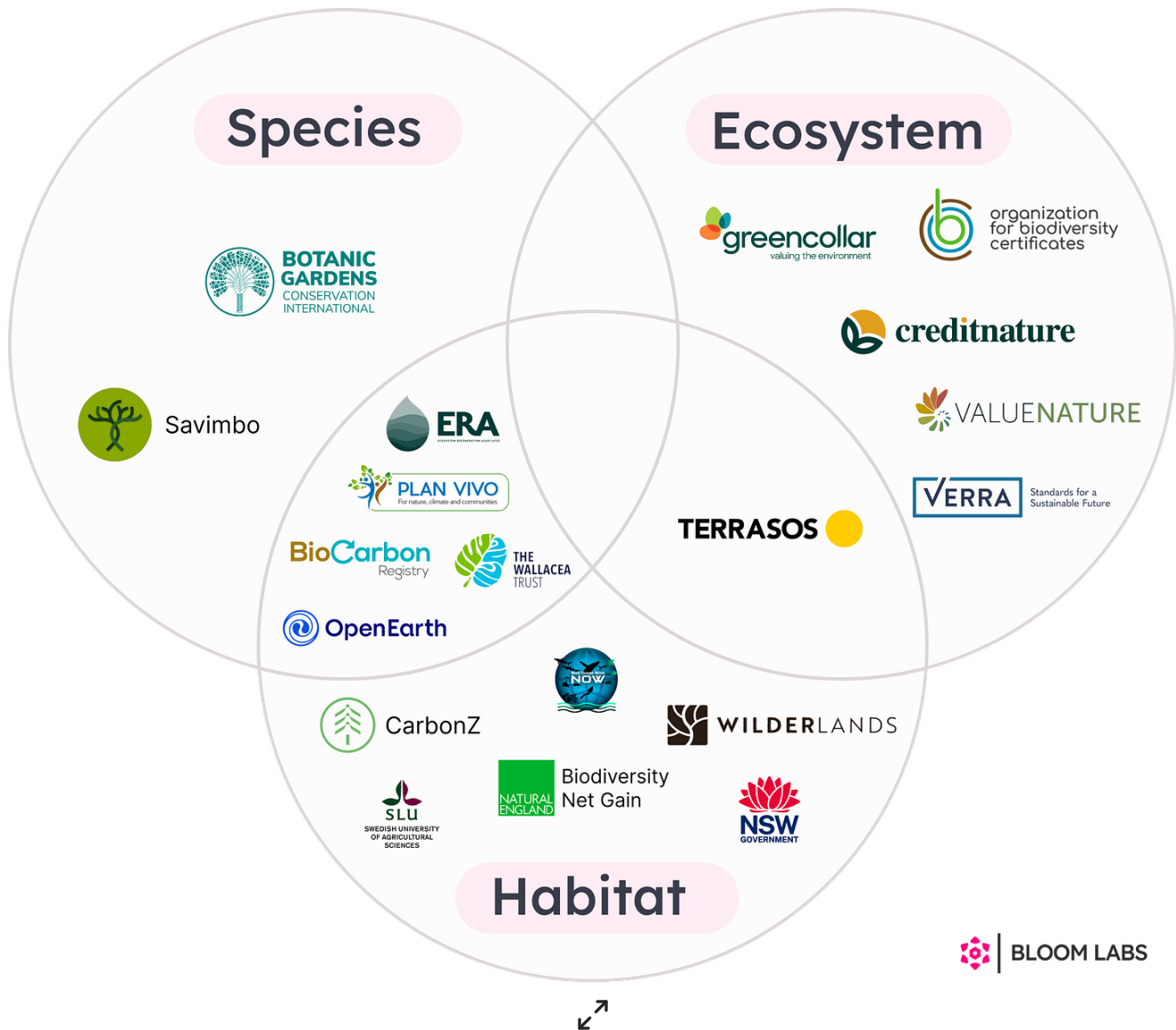


Figure 2: Biodiversity credit scheme categorization between species, habitat and ecosystem levels.

**Credit calculation indicators are very diverse**

Although it is possible to somewhat subcategorize the most used indicators, most of them are approached and measured slightly differently. Now, obviously biodiversity is (literally) unimaginably complex and deserves nuanced measurements even for the same indicator. The end result is more confusion for the non-ecologists though.

Species	Habitat	Ecosystem	Misc
<p><b>Species Population</b></p> <ul style="list-style-type: none"> <li>Species abundance</li> <li>Wildlife populations</li> <li>Population density</li> <li>Community composition</li> </ul> <p><b>Species Variety</b></p> <ul style="list-style-type: none"> <li>Species richness</li> <li>Species diversity</li> <li>Taxonomic dissimilarity</li> <li>Species endemism</li> <li>Community composition</li> <li>Habitat composition</li> </ul> <p><b>Keystone Species</b></p> <ul style="list-style-type: none"> <li>Indicator species integrity score</li> <li>Taxonomic diversity</li> <li>Species occupancy</li> </ul> <p><b>Risk</b></p> <ul style="list-style-type: none"> <li>Threatened species</li> <li>Species vulnerability</li> </ul>	<p><b>Condition</b></p> <ul style="list-style-type: none"> <li>Habitat condition</li> <li>High Conservation Values</li> <li>Riparian forests &amp; water sources protection</li> <li>Wildlife/habitat intactness</li> <li>Biodiversity (level)</li> </ul> <p><b>Significance</b></p> <ul style="list-style-type: none"> <li>Habitat strategic significance</li> <li>Strategic value</li> <li>Biodiversity significance</li> </ul> <p><b>Connectivity</b></p> <ul style="list-style-type: none"> <li>Habitat connectivity/rugosity</li> <li>Landscape fragmentation</li> <li>Landscape connectivity</li> <li>Improved habitat integrity &amp; connectivity</li> <li>Connectivity</li> </ul> <p><b>Structure</b></p> <ul style="list-style-type: none"> <li>Habitat distinctiveness</li> <li>Natural disturbance</li> <li>Habitat/ecosystem extent</li> <li>Habitat diversity</li> <li>Intensity of use land use</li> <li>Ecosystem resilience</li> <li>Habitat/ecosystem structure</li> <li>Landscape composition &amp; configuration</li> <li>Land cover/land use proportion</li> <li>Habitat composition</li> <li>Landscape element morphology</li> </ul>	<p><b>Ecosystem Functioning</b></p> <ul style="list-style-type: none"> <li>Food web complexity</li> <li>Niche utilization</li> <li>Ecosystem vigor</li> <li>Ecosystem function</li> </ul> <p><b>Condition</b></p> <ul style="list-style-type: none"> <li>Ecosystem rank</li> <li>Econd®</li> </ul> <p><b>Connectivity</b></p> <ul style="list-style-type: none"> <li>Species dispersal</li> </ul> <p><b>Risk</b></p> <ul style="list-style-type: none"> <li>Ecosystem threat</li> <li>Ecosystem pressures</li> </ul>	<p><b>Risk</b></p> <ul style="list-style-type: none"> <li>Uncertainty (Shannon entropy)</li> <li>Difficulty</li> <li>Time to target condition</li> <li>Spatial risk</li> </ul> <p><b>Management</b></p> <ul style="list-style-type: none"> <li>Property management</li> <li>Financial strategy</li> <li>Management goals</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Social engagement</li> </ul> <p><b>Productivity</b></p> <ul style="list-style-type: none"> <li>Pcond®</li> </ul>

Figure 3: Categories and subcategories of the current biodiversity credit calculation indicators. FYI: some indicator names don't reflect the actual metrics measured.

### Area, duration and project type are virtually ubiquitous indicators

The three indicators that stood out almost everywhere are project area (usually measured in hectares or km<sup>2</sup>), project duration (from 1 to 100 years), and project type (usually preservation or restoration).

### There is still a lot of uncertainty on what metrics will be used

Metric uncertainty falls into 2 categories for now: metric flexibility by design (e.g. [Organization for Biodiversity Certificates](#) or [Wallacea Trust](#)) and metric uncertainty due to early stage of development (e.g. [OpenEarth Foundation](#) or [ValueNature](#)). Whether the “flexibility by design” approach works at scale is yet to be seen. And although such approaches are partially created for the sake of scale, ironically, lack of standardization might interfere with that.

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### **There are basically no social/community metrics**

Out of 60+ different indicators/metrics, only 1 is focused on social engagement. We’re clearly seeing the focus being put on (quantified) biodiversity uplift first and fair benefit sharing later. We shouldn’t forget one mantra here though: durable biodiversity outcomes are only possible if the living conditions of the local communities are also improved.

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### **Comparing schemes is difficult (surprise surprise)**

Every biodiversity scheme uses a slightly different combination of indicators to calculate the credits. The same indicator can be calculated in multiple different ways (e.g. species richness or abundance). Sometimes the indicator name and the actual metric behind it don’t match that well. For the credit purchasers, it’s a mess.

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### **Too much complexity does exist**

Quantifying biodiversity is obviously incredibly complex. The challenge is to maximally simplify it without losing quality. However, using 10+ (complex) metrics isn’t serving complexity well either. If understanding the different metrics used to calculate biodiversity credits takes hours, something isn’t right.

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## **How do these indicators & metrics relate to voluntary and regulatory nature-related frameworks?**

There is a lot of action on the nature-related disclosure and target-setting space. I’ll go over the main suspects:

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### **Taskforce on Nature-related Financial Disclosures (TNFD)**

[TNFD](#) is the main voluntary corporate disclosure framework for mapping out company’s nature-related dependencies, impacts, risks and opportunities. It was launched last month (September 2023) and has been making waves. Here are some similarities and differences in metrics used for biodiversity credits and TNFD:

## Similarities:

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### Ecosystem and species metric focus

Similar to biodiversity credit metrics, TNFD prioritizes ecosystem & species (particularly related to extinction) metrics. Both biodiversity credit schemes and TNFD are using some of the same widely accepted species/ecosystem-level databases (e.g. IUCN Red List). TNFD even explicitly mentions some of the biodiversity credit metrics: [Accounting for Nature's Econd®](#) for ecosystem and [Botanic Gardens Conservation International's Biodiversity Impact Credits](#) for (tree) species extinction risk.

### Focus on ecosystem restoration and preservation

Ecosystem restoration and preservation activities are split into mandatory & voluntary and is one of the core focus points for TNFD.

### Land use metrics

Land use change is one of the top 5 biodiversity loss drivers. TNFD recognizes that and outlines multiple metrics built around it. That's similar to most biodiversity credits who have land size baked into their credits.

## Differences

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### Species & ecosystem categorization

Instead of separating metrics into species, habitat and ecosystem levels, TNFD lumps habitat metrics into the ecosystem bucket. And since ecosystem is such a catch-all term, that makes sense. [Verra](#), for example, is adopting the exact same approach for their draft biodiversity credit metrics as well.

### Company-specific metrics

Every metric tracked for TNFD reporting is meant to be relevant to the company. Hence, they are more focused on the company-specific metrics and measuring the them against a clear objective. Since most of these metrics are based on inputs & outputs, they're usually easier to quantify (e.g. land use intensity, amount of pollutants released to soil, % of natural vegetation in croplands, etc.). That's not usually the case for biodiversity credit metrics.

### Ecosystem services-driven metrics

Since companies directly rely on ecosystem services (e.g. fresh water, healthy soils, pollination, flood regulation, etc.), many TNFD metrics are based on them. They are the nature values that are most easily put into the monetary terms and hence directly inform company's risks and opportunities. On the other hand, biodiversity credit metrics focus more on the ecosystem condition (e.g. ecosystem functioning & species-level metrics).

## Summary

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So, there is definitely some overlap between the biodiversity credit and TNFD-suggested metrics. Some of the credit metrics can be used when mapping the company's dependencies and impacts. However, I'm not yet sure if there's a way for a tighter metric-level integration between these two, especially since most of the TNFD overlapping metrics are additional (i.e. voluntary) for now.

## **Science Based Targets Network (SBTN)**

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SBTN Targets for Nature is developing the first global (voluntary) corporate target-setting framework for nature. It's highly aligned with TNFD: first you map out your dependencies, impacts, risks & opportunities, and then you set nature positive targets accordingly. Similar to TNFD, the framework prioritizes very company-specific nature metrics which barely overlaps with biodiversity credit metrics. At the moment, the metrics are only available for freshwater ecosystems, with biodiversity metrics planned to be released roughly within a year.

## **Corporate Sustainability Reporting Directive (CSRD)**

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CSRD is a mandatory (yes!) sustainability disclosure legislation for (mostly) large companies operating within the EU. It's the first law of its kind in a major economy and will start being applied for the 2024 reports. The law is very broad with the ESRS E4 Biodiversity and ecosystems standard being only one category among 12 ESG-focused ones. Unfortunately, disclosing metrics from this standard is not mandatory if the company doesn't consider them "material". Although companies will need to justify their materiality assessments, allowing them to choose which metrics to report worries me.

Similar to TNFD, CSRD's focus is on the disclosure of biodiversity and ecosystems-related dependencies, impacts, risks & opportunities. Suggested indicators and metrics are also highly aligned - similar focus is put on ecosystem, land use, species & company-specific metrics. Hence, CSRD's and biodiversity credit indicators & metrics overlap as well.

## **Are we going in the right direction?**

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We're currently seeing an explosion of new biodiversity credit schemes and the different indicators & metrics they use for credit calculation. At some point, the schemes will probably start consolidating. That's natural. The question is, is that good and will the highest quality metrics be preserved? The power lies in the leading schemes but probably no one ecologist would agree that these schemes indeed have the optimal metrics for biodiversity quantification. So how do we create conditions for the best metrics (i.e. those that are best balanced for accuracy, scientific rigor, cost, accessibility, scalability & granularity) to become more widely adopted? I'm not (yet) sure if market competition will lead to the highest quality products being adopted in this industry.



## Conclusions

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The general findings aren't that surprising: calculating biodiversity credits is extremely complex and context-specific. Multiple interrelated indicators are being considered, with no obvious standards around which ones will dominate the space (apart from species richness & abundance, the foundational biodiversity indicators). Few things are clear: the biodiversity finance space is thankfully exploding and the methods & technology to measure biodiversity are improving. The end result is inevitably higher quality, more scalable and more granular metrics around biodiversity gain. That should lead to more resources flowing to nature and communities safeguarding it - a future I can get behind.

And once again: [here's the list of all the biodiversity credit calculation indicators and metrics, grouped by each scheme.](#)

*Thanks to Ash Welch and Francielly Monteiro for suggestions and the initial draft feedback.*