BIODIVERSITY CREDITS:

POTENTIAL AND ENABLING CONDITIONS IN SOUTHEAST ASIA

August 2025

rePLANET

EXECUTIVE SUMMARY

There is huge interest worldwide in finding ways in which nature markets can be established that can help fund the 30 x 30 commitments made by governments as part of the Kunming-Montreal Global Biodiversity Framework. Without private sector investment, funding available from governments or philanthropy will be nowhere near sufficient to meet national commitments to ensure protection and restoration of 30% of land and water by 2030. This interest has led to the establishment of numerous working parties (International Advisory Panel on Biodiversity Credits, World Economic Forum, Biodiversity Credit Alliance) aimed at establishing how biodiversity credit markets could, and should, be established. In addition, at least 50 different methodologies and standards have been designed to quantify biodiversity, but each of these output units that are non-comparable, which prevents units of biodiversity gain from different projects being traded or investors being able to quantify the biodiversity benefits of their investments across different projects. Despite all this effort, the value of biodiversity credits traded worldwide to date is a maximum of $8 million.

There are three blockages that are preventing biodiversity credits becoming a liquid market:

1. There needs to be an agreement on what constitutes a unit of biodiversity gain

For all its faults, the carbon market started with an agreed unit of climate change (one tonne of carbon dioxide equivalent sequestered or not emitted), which enabled multiple methodologies to be developed that all produced output units that met this definition. The biodiversity credit market has missed out this stage of first developing an agreed unit of biodiversity gain, which has led to confusion in the marketplace. Negotiating such an agreement proved impossible despite numerous attempts, most notably by the Biodiversity Credit Alliance (BCA) which resulted in the lowest common denominator definition of a unit of biodiversity gain in order to try and fit with as many biodiversity credit methodologies as possible. The BCA definition is "a biodiversity credit is a certificate that represents a measured and evidence-based unit of positive biodiversity outcome that is durable and additional to what would have otherwise occurred." There are no units associated with this definition, so in theory, a 1% increase in a single species over 10m² could qualify as a biodiversity credit, although few people would regard a single species increase over such a small area as representing an overall increase in biodiversity. The International Advisory Panel on Biodiversity Credits (IAPB) published its framework for high integrity biodiversity credit markets in 2024, but did not address the issue of how biodiversity gains should be unitised. Part 1 of this report analyses how each of the 50 methodologies perform against a series of criteria and how the most rigorous definition - "a unit of biodiversity gain is a 1% increase in the median value of a basket of metrics that reflect the conservation objectives for the submitted habitats with additionality and permanence" - is gaining the most traction worldwide. The definition works for certification through Verra, Plan Vivo and the Wallacea Trust Methodology with verification by the Biodiversity Futures Initiative. With small modifications, some of the other methodologies could also become compliant with this definition. **Recommendation 1** in Part 4 of the report is that governments should use the above definition (in shorthand referred to as the multi-metric definition) when considering biodiversity credits, which would minimise the risk of greenwashing accusations.

Part 1 of the report also explains how the costs of data collection needed to meet the multi-metric definition can be kept below carbon credit monitoring costs by using the approach of taking the data to the scientist, rather than the scientist to the data. In practice, this means training locally based people in how and where to install monitoring devices (camera traps, audio moths, pitfall, Malaise or pollinator traps), and collecting data using photo quadrats and app-based technologies. The digital data, samples and survey record sheets can be analysed by experienced scientists to produce the data needed to quantify the biodiversity gain. Part 1 also contains a discussion of how a 20% buffer should be deducted from the estimated number of units of gain before credits are issued to allow for uncertainty in the precision of the estimates. Additional deductions are also needed to account for any leakage (unintended losses of biodiversity elsewhere resulting from the project actions). The difficult (in comparison with carbon) issue of how leakage can be estimated, including by using dynamic baselines, is also discussed in Part 1.

2. There is a lack of price discovery

The second blockage to biodiversity credit markets becoming liquid is the lack of price discovery. Carbon projects are funded in advance by investment funds who examine the costs of production for each carbon credit, and then from existing data on prices and trends decide whether they could make a profit on reselling those credits if they were to invest. This approach opens up huge private sector sums for investment, and carbon investments are considered alternative options to investing in infrastructure or other types of projects. With so few biodiversity credits traded and those that have been traded being in non-comparable units, no data exist on which investors can make a decision on whether to invest in biodiversity credit-producing projects. Price discovery for biodiversity credits is needed in order for private sector investment, which will require a return on investment, to start. The way to do this is to persuade governments, multilateral development banks or private sector philanthropy to quantify the units of biodiversity gain being achieved from their donations to wildlife conservation or restoration projects. These independently verified gains, with a buffer deducted for uncertainty and any leakage, can then be issued as biodiversity credits that the donor body can sell to recoup their initial sum plus a small profit. This will not only allow donations to wildlife projects to be returned and recycled through investment in subsequent projects, but has the added benefit of providing price data which in turn will lead to the development of commercial (rather than philanthropic or public money) investments. **Recommendation 2** is therefore that projects already being funded by public or philanthropic money or multilateral development bank loans have their biodiversity benefits quantified, and biodiversity credits issued, so that price data can be established.

3. No clear business case for investing in biodiversity

The third blockage is that there is no clear business case for corporates to invest in biodiversity, and this is stifling demand. Part 2 of the report describes how this demand is beginning both from the reporting requirements on businesses trading with the EU and from voluntary initiatives to promote best practice such as TNFD and SBTN. There are a small number of leading companies in differing sectors that are looking to experiment with supporting wildlife conservation projects using biodiversity credit income, but the market is nascent. Developing legal requirements for companies registered within each of the SE Asian countries to report annually on their nature impacts would help stimulate demand (see **Recommendation 3**) in the region and be in line with similar developments elsewhere in the world.

The report describes how there are two ways in which biodiversity can be monetized – indirectly and directly. Indirectly is where the biodiversity gain from nature-based carbon projects is quantified, so that the buyers of carbon credits from the project can claim that they are sourcing their carbon from projects that demonstrate a significant increase in biodiversity. This helps increase demand and therefore value of the carbon credits. **Recommendation 4** suggests that SE Asian governments should, through their approval systems for carbon credits, require that all nature-based carbon projects also quantify the biodiversity gain to enhance the sale value.

The carbon market has become very suspicious of low-quality carbon credits and there is a move to demand credits from nature-based projects that provide a fair contribution to local stakeholders and with quantified biodiversity units. At present, these latter credits will sell at $50+, whereas lower quality credits will frequently be around the $20 mark. Clearly adding biodiversity and social benefits has a significant impact on the value of carbon credits. Part 2 of the report gives an example of where biodiversity is being quantified and used to increase the value of carbon credits being sold to restore disused shrimp ponds to mangroves in SE Sulawesi, Indonesia.

The other way of increasing the value of carbon projects is to ensure that the local stakeholders (owners, users and managers) receive 60% of the final value of the project (see **Recommendation 5**). The final value of the project includes not just the baseline budgets, but also the profits made on selling the carbon credits. Payments to governments either in taxes or donations to their Nationally Determined Contributions (NDCs) should be counted within this 60% commitment and should be set at levels that will still ensure that stakeholders on the ground receive a good percentage of the benefits, since without these payments the project is unlikely to work long term. 60% of the final value of the project is the maximum that can be modelled and still allow the investor to get a reasonable return on their investment and the management costs of the developer to be covered.

The second way of monetizing biodiversity is directly by quantifying units of gain and selling them as biodiversity credits. This is necessary where there is restoration or protection of habitats with little or no carbon (e.g. coral reefs, freshwater habitats and grasslands). Part 2 of the report gives an example for how this could be done to restore overfished reefs in Malaysia. Given that biodiversity credits are a novel financial instrument and there has been virtually no price discovery, such a project is currently unlikely to attract commercial investors. However, by issuing biodiversity credits, it is a much more attractive to philanthropists since they have a good chance of getting their initial donation sum returned and earning a reasonable return on the investment. **Recommendation 6** in the report is for governments to facilitate these types of philanthropic donations resulting in issued biodiversity credits, so that much of the world's philanthropy will concentrate on the SE Asian region.

The supply opportunities for these types of projects are almost infinite. Part 2 of the report therefore has a section which identifies the criteria to look for when selecting a project to maximise the chance of funding being received from biodiversity credits.

The report concentrates mainly on the potential for voluntary biodiversity credits. However, a few countries have developed biodiversity legislation requiring developers of new infrastructure projects to compensate for loss of specific habitats such as wetlands or native forest. Most of these schemes require like for like replacement of damaged habitats (e.g. USA, Australia, New Zealand). In the UK, biodiversity legislation requires quantification of all habitats at a project development site both before and after the project is implemented. The total biodiversity value post development must be at least 10% higher than the pre-development score. The UK system works by scoring the relative value of each habitat type and weighting this score by the condition of that habitat. This habitat type and condition value is then multiplied by the area in hectares to give a total score for the site being developed. The UK system is unique in the sense that it has unitised biodiversity which allows trading of these biodiversity credits. **Recommendation 7** proposes that the SE Asia countries develop similar biodiversity offsetting legislation which will help increase demand for biodiversity credits. **Recommendation 8** is that the SE Asian countries develop a similar habitat scoring scheme to the UK, which would then facilitate the introduction of the biodiversity offsetting legislation for new projects.

Part 3 of the report looks at biodiversity legislation within each of the focal countries (Indonesia, Malaysia and the Philippines). Carbon legislation seems to be well developed in most of the countries, and it is recommended that when the time comes for introducing legislation for governance of biodiversity credits, the legislation is based around the pre-existing carbon legislation. Given the nascent nature of the biodiversity credit market and the need to encourage investment into wildlife conservation, it is suggested that a light touch approach is adopted at this early stage of market development (**Recommendation 9**). In addition, training of government, IPLD representatives and NGO staff on how to package projects for quantification and verification of units of biodiversity gain and issuance of biodiversity credits would be valuable (**Recommendation 10**). Part 4 of the report summarises the recommendations for SE Asian governments on how to stimulate biodiversity credit income to help support their 30 x 30 commitments.

KEY RECOMMENDATIONS

1	Agree a unit of biodiversity gain definition
2	Encourage issuance of biodiversity credits from publicly and philanthropically funded projects
3	Introduce legislation to require companies to report on their nature impacts
4	Require biodiversity quantification for nature-based carbon projects
5	Ensure local stakeholder benefits
6	Encourage private sector investments in wildlife conservation
7	Introduce compliance legislation
8	Develop habitat quantification systems
9	Governance of biodiversity credits
10	Capacity training for issuance of biodiversity credits

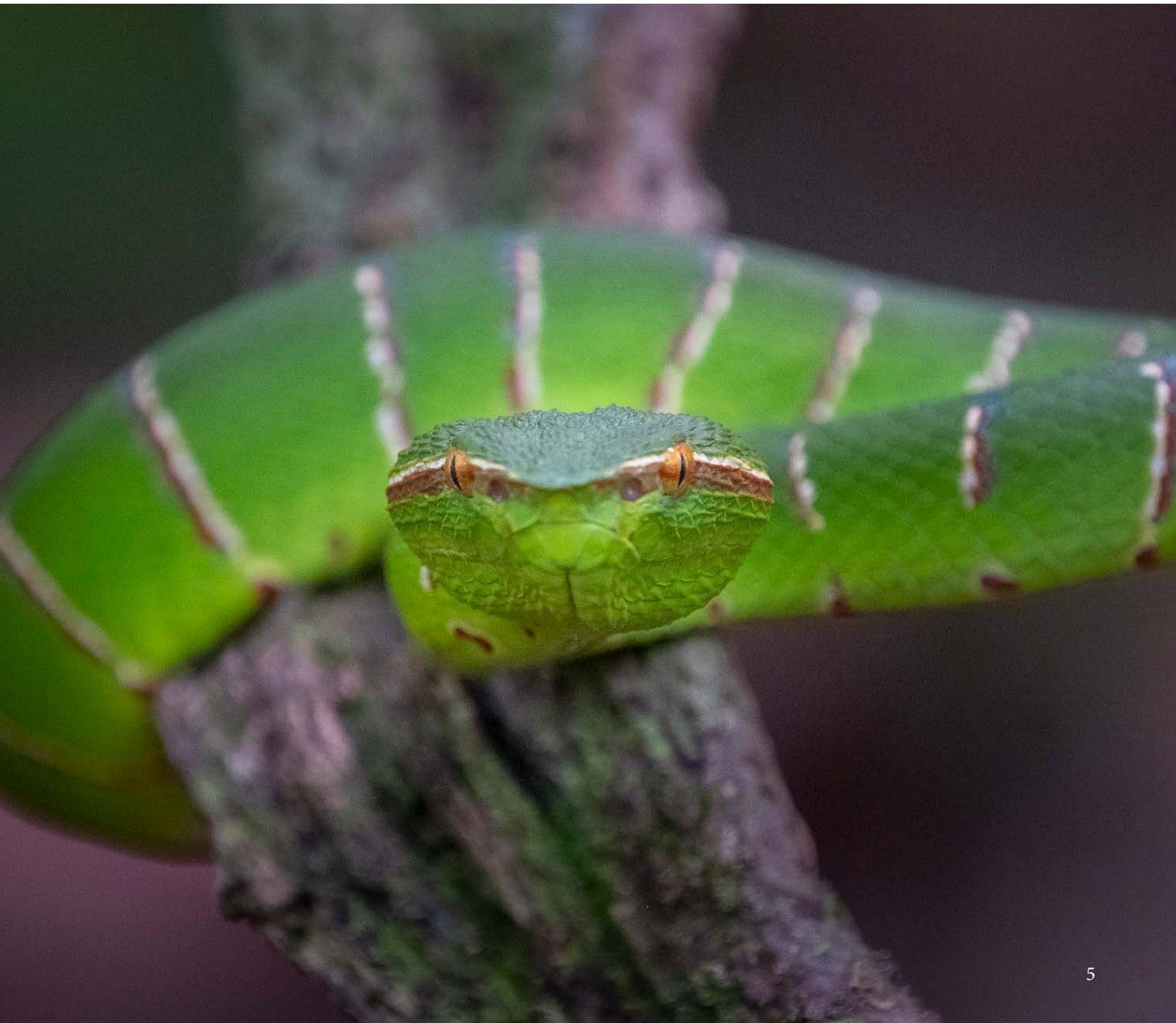
See Section 4 for full recommendations

INTRODUCTION

Southeast Asia, one of the most biodiverse regions in the world, faces mounting threats from deforestation, over-exploitation, habitat fragmentation, pollution, and climate change. In the face of these challenges, biodiversity credits are emerging as an innovative financial tool for incentivising conservation and channelling funding into protecting and restoring ecosystems around the world.

Biodiversity credits represent measurable, verifiable gains in biodiversity. The credits enable governments, businesses, and communities to monetise and trade units of biodiversity gain that result from nature-positive actions, creating a market-driven approach to biodiversity protection.

This report explores the potential for biodiversity credit markets in Indonesia, Malaysia and the Philippines, evaluating the currently available methodologies for calculating biodiversity credits, the drivers of supply and demand for them and the policy and legal landscapes surrounding them. It presents two examples of potential projects that would be financially viable and beneficial to local people and ecosystems, and finally provides a series of recommendations for creating the enabling conditions for credible and equitable biodiversity credit markets.



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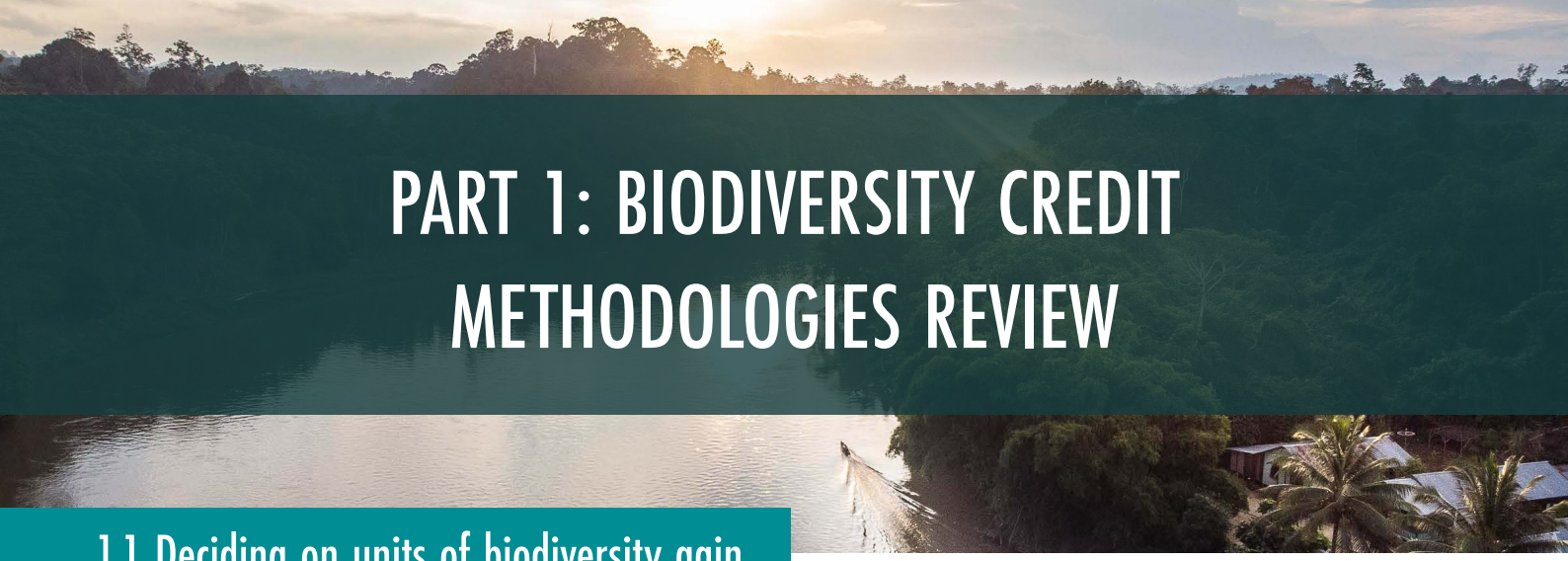


PART 1: BIODIVERSITY CREDIT METHODOLOGIES REVIEW

1.1 Deciding on units of biodiversity gain

This report and the attached table (Appendix 1) present a review of 50 biodiversity credit methodologies, that are either currently being used or are being developed for monetising biodiversity. The problem with having so many different methods is that they each produce outputs in different formats, so the biodiversity value from investment in Project 1 developed using Method A cannot be compared with the value of Project 2 quantified using Method B. Without that comparability, the unit of comparison is a subjective one based on the appeal of Project 1 compared with Project 2.

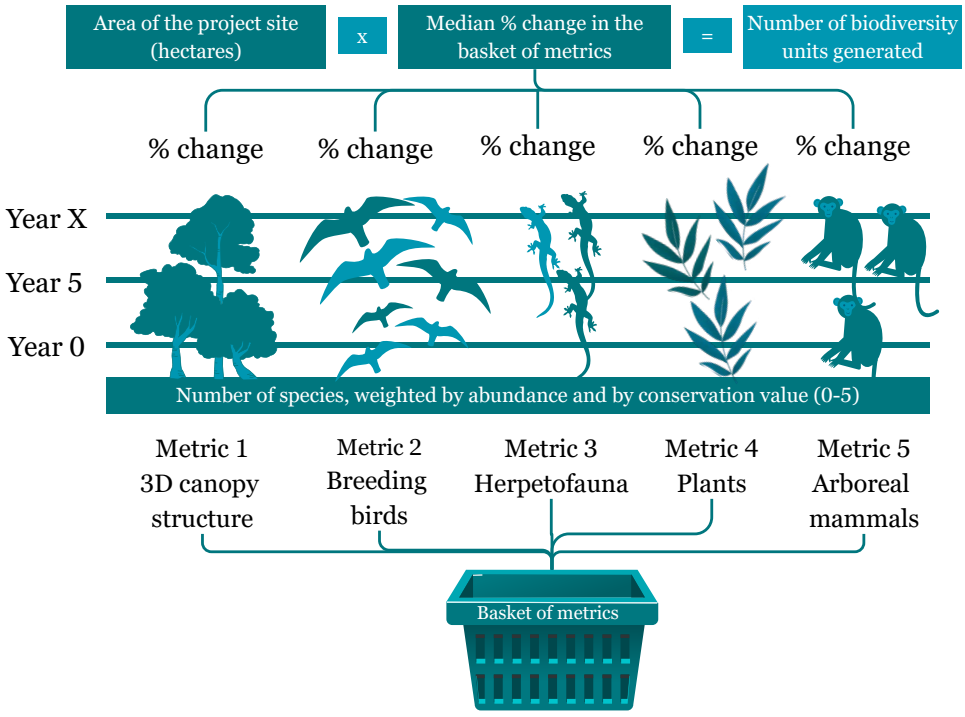
The reason that the carbon market works, for all its faults, is that whilst there are multiple methodologies, they all agree that a unit is 1 tonne of carbon dioxide equivalent, either sequestered or not emitted. All carbon methodologies produce their outputs in this unit; the same, agreed unit of change is what is required to make the biodiversity credit market work.

In 2021, the World Economic Forum (WEF) and Verra requested that one of the authors of this report complete a consultation with as many biodiversity credit developers as possible over how such a unit could be developed (see Appendix 5). The output of this report was that the most rigorous methods were all using a basket of metrics to quantify biodiversity change. Since then, the definition below of a unit of biodiversity gain has become widely accepted:

A 1% gain per hectare in the median value of a basket of metrics or taxa that reflect the conservation objectives for the submitted site, with additionality and permanence.

For this reason, when reviewing the various methods, one of the criteria used was whether the outputs are specified in units of 1% gain per hectare. This definition works for the leading verification bodies (Verra, Plan Vivo and Biodiversity Futures Initiative (BFI)). Verra, Plan Vivo and the Wallacea Trust/BFI standards all use at least five taxa, but the number of metrics or taxa that are used to quantify the basket of metrics is not specified in the definition. Thus, multiple methods (but not all) reviewed in this report could meet this definition, with varying grades of confidence around the claim.

This diagram visualises the basket of metrics approach, using example metrics chosen for a hypothetical rainforest restoration project in Indonesia (see Part 2). The Wallacea Trust Methodology recommends using at least five metrics that well reflect the conservation aims of the project. There should be at least one structural metric (3D canopy structure in this example), and at least four metrics that use species richness and relative abundance of flora and fauna taxa (breeding birds, herpetofauna, plants and arboreal mammals in this example).



1.2 Criteria for assessing methodologies

Clearly if all taxa at a site were measured, the data would more reliably demonstrate an overall increase in biodiversity than estimating overall improvements at a site by measuring one single species. While it is impossible to measure all aspects of a biodiversity at a site, the more taxa that are measured, the more likely the results are to be reflective of the actual increase in biodiversity. A grading system is therefore proposed (Table 1).

Table 1: Grading system for the quality of claims that meet the 1% unit of gain per hectare definition.

Entry level	For habitat only or single species surveys
Bronze level	For units produced with one vegetation metric and two faunal or flora taxa metrics
Silver level	For units produced using vegetation metric and three faunal or faunal taxa metrics
International standard	For units produced with one structural (e.g. habitat) metric plus at least four or more faunal and floral taxa metrics

Note for this review, only methods that can quantify the biodiversity gain of a site are considered. If a corporate or government wants to identify which of a number of their managed sites or those of their suppliers are the ones to concentrate their investments on first to have maximum impact, they need to look at methods that use existing databases. These biodiversity screening methods can be used to complete rapid assessments; examples could include STAR, Biological Intactness Index and SEED Biocomplexity Index. These are not methods that work well at quantifying uplift or avoided loss at a project level, but are excellent for regional or country level comparisons.

The criteria below were used when reviewing the numerous biodiversity credit methodologies that currently exist (Appendix 1 - green cells indicate that a methodology meets a criterion).

Table 2: Criteria used to evaluate the biodiversity credit methodologies in Appendix 1.

Column	Title and explanation
E	**Standard or methodology** Methodology: A protocol for quantifying biodiversity in a specified habitat(s). Standard: Allows methodologies to be used to produce units of gain, and often also to issue the credits. It also sets eligibility criteria for projects such as additionality and permanence. A standard may include a variety of methodologies, allowing project managers to choose from a list, or only one.
F	**Outcome/practice-based** Outcome-based methodology: Units are based on direct measurements of ecosystem or biodiversity changes that result from the project interventions at regular intervals. Practice-based methodology: Units are based on restoration or threat-reduction activities, rather than on the results of those activities. This results in an indirect measurement of biodiversity. Direct measurements of biodiversity change (in outcome-based methodologies) give greater certainty than implying change results from threat reduction or restoration activities because the relationship between activities and impacts on biodiversity is very rarely linear. For example, in Fiji one of the main suppressants of ground breeding birds, reptiles, amphibians and endemic snail species is predation by an invasive species, the dwarf mongoose. If a project proposed reducing the mongoose population by 10% or 50% or 80%, would this result in an equivalent increase in ground birds, reptiles, amphibians and endemic snails? This is highly unlikely – complete removal of mongoose would result in a large increase in the other taxa, but partial removals are not likely to cause a corresponding change in the other fauna. There are many examples like this where the relationship between a threat and the impacts on various taxa is non-linear. Using implied changes to quantify biodiversity gains is therefore likely to be highly inaccurate.
G	**Open source and freely available to use** For a method to be selected for developing a biodiversity credits market, it must be open source and free to use. There are some methods which require a payment to a method developer, and these are unlikely to be scalable. Some method developers provide some information but are opaque about the exact calculations used in the methodology, making them impossible for project managers to consider using and their viability difficult to assess.
I,J	**Universally applicable** To be scalable, it is important for a methodology to be applicable to all ecosystems and habitat types so that it can be used to produce comparable outputs across all project types. For example, many methodologies only apply to terrestrial ecosystems and cannot be used for marine projects, meaning that a marine project would have to use a different methodology which would produce a non-comparable output.
K	**Geographical restrictions** It is important that a methodology is applicable in any country in the world. Some of the methodologies can only be applied to projects in the country that they were developed in, so cannot be used internationally.
L	**Summary of method for calculation** A short summary of the methodology. The URL in Column Z links to the full methodology for more details.

M

Definition of a biodiversity unit
Methodologies require a definition of a biodiversity unit that is comparable across different projects and can be used to produce biodiversity credits where appropriate.

N

Likelihood of being understood by investors
Some methodologies are very complicated and difficult to explain to a lay person, meaning it is difficult for investors to understand the integrity of projects using them. While biodiversity is a complex subject, a methodology needs to be communicable for it to scale up. Ease of understanding is rated as low/medium/high.

O

Third party verification
Verification of a project by a third party is essential to ensure its' data are accurate and reliable. Third party verification may happen when the methodology is already approved and the auditing just checks that it has been applied correctly (e.g. Accounting for Nature) or where the auditing examines the raw data to verify the size of the claim (e.g. Wallacea Trust, Plan Vivo). The latter approach (third party verification of the size of claims) is more rigorous because it audits the data and not just the process, which is essential for the market to trust those claims.

P

Approach to verification and credit issuance
The issuance of credits should be a separate process to verification and be based on issuing as units of 1% gain per hectare but only for a percentage (e.g. 80%) of the claim; a portion (e.g. the remaining 20%) should be retained as a buffer in case unforeseen circumstances (e.g. drought, conflict) affect the project. Most methods do not do this and conflate units of biodiversity gain with biodiversity credits.

Q

Verification of gain without credit issuance
Verification of units gained without automatically issuing credits is important because the biggest demand for verified units of gain is from corporates wanting to account for their biodiversity gains and report them, rather than trade them as credits.

R

Entire taxa used in calculations
Surveying entire taxa (e.g. entire taxonomic or functional groups of species) is much more accurate than measuring single indicator species. For example, one indicator species chosen to represent pollinators could increase, while in reality pollinators overall declined.

S

Weighting of species conservation value
Many methodologies involve measuring species richness and/or abundance, but don't weight the abundance of species by their conservation value, e.g. its level of threat as determined by the IUCN. Weighting a species by its conservation value is important as species richness alone can give strange results. For example, a pristine rainforest in Fiji could support 10 breeding bird species whereas an adjacent sugar cane arable habitat may have 20 breeding bird species. Based on species richness alone, there would be an argument to remove pristine rainforest in favour of sugar cane production. Weighting each species by conservation scores on a 0 – 5 scale, (where 0 is an invasive, 1 is a widespread abundant species and 5 is critically endangered) gives a very different picture. All 10 of the forest species are likely to score a 5 each since they are endemic to Fiji's forests, whereas half of the sugar cane birds are invasives (score 0) and the remainder are widespread and abundant. This means the data are then 50 for weighted species from pristine forest and 10 for the weighted species from sugar cane, giving a result much closer to what most biologists would see as the relative value of those two habitats.

T

Changes in abundance or biomass affect the scores
It is important that a measure of abundance or biomass is included. Statistics on biodiversity loss refer to declines in abundance and biomass, so any measure of biodiversity value needs to include a measure that represents the relative abundance of taxa. For example, if a site is being protected for a population of a rare species and that site subsequently loses 90% of that population, then if only species presence and absence is being used to quantify the biodiversity the scores won't change for that site even though only 10% of the population remains.

U

Complies with WEF Biodiversity Unit of Gain definition
The methodology complies with the World Economic Forum's definition of a unit of biodiversity gain, which has become widely accepted:
A 1% gain per hectare in the median value of a basket of metrics or taxa that reflect the conservation objectives for the submitted site, with additionality and permanence.

V

Permanence requirements
This must follow the same requirements as for carbon projects – at least for the project length (e.g. 25 years) with measures put in place during that project period to maximise the chances of the biodiversity gains being retained for 100 years (e.g conservation designation, a long-term development plan with business income related to protecting the habitats and species). Some methods only require short term increase or avoided loss in biodiversity at a site (e.g Verifiable Nature Units issued by Landbanking use one year, Cercarbono use one month) as their permanence criterion.

W

Additionality criteria
Criteria that ensure additionality, i.e. that the project activities are directly causing biodiversity gain, which would not occur without them. This ensures that credit purchases are funding valid projects, which would not be generating biodiversity gain without the sale of the credits. Some methodologies do not require additionality (Verra Stewardship Credits, Verifiable Nature Unit), meaning the same biodiversity outcome could have happened whether or not the credits had been purchased. It was challenges over additionality that caused the carbon REDD+ market to crash, a cautionary tale for the nascent biodiversity credit market to avoid adopting methods that do not require additionality.

X

Suitability for use as a methodology
A brief summary of the methodology's suitability based on this review.

Y

Additional Notes

Z

URL

1.3 Comparing selected methods

The various standards and methods were classified into the following groups:

1. Multi-metric methodologies with at least five taxa measured
2. Other active and universally applicable methodologies
3. Active methodologies not universally applicable to all countries or ecosystems
4. Methodologies still under development

In order to make the report more readable details of the methodologies in groups 2 – 4 have been included in Appendix 2.

Multi-metric standards with at least five taxa measured

Wallacea Trust/Biodiversity Futures Initiative

The Wallacea Trust Methodology for Voluntary Biodiversity Credits is verified through the Biodiversity Futures Initiative (BFI). A biodiversity unit is measured as a 1% gain in the median value of a basket of at least five taxa that reflect the conservation objectives for the site, where additionality and permanence are ensured.

The method uses five or more metrics: a structural metric and at least four additional faunal and floral phylogenetic or functional taxa. Each species within the taxon is weighted by conservation value on a 0-5 scale (where 0 is an invasive species and 5 is a critically endangered species) and on a 5-point scale according to relative abundance in comparison to a reference site. For each taxon, abundance and conservation value scores are multiplied together for each species and then summed. For uplift projects, the surveys are repeated after a time period (most commonly every five years) and the percentage change in the score of each taxon is calculated. The median of the percentage change of the taxa multiplied by the area in hectares gives the number of units of gain.

For avoided loss projects, the median difference between the submitted site and a paired development site (what the submitted site will become over the project lifetime (e.g. 25 years) in the absence of an intervention) multiplied by the area of the submitted site gives the numbers of units of gain that can be claimed if the developer can protect the submitted site for 25 years.

The Biodiversity Futures Initiative is an independent body that verifies the units of gain calculated using the Wallacea Trust Methodology and issues biodiversity credits. Peer reviewers evaluate the project design, chosen metrics, baseline quantification and uplift claims ensuring scientific validity. BFI does not issue credits, and this has to be done by a third-party independent body so that there is no incentive for the verifying body to benefit from verifying a large claim when they are rewarded for additional income from the credits issued.

The Wallacea Trust Methodology is easy for investors the understand and is in the process of being adopted by frameworks used by other organisations, including the UK Woodland and Peatland Codes, the Forestry Stewardship Council. It produces outputs compatible with the Verra SD Nature Framework.

A potential disadvantage of this approach is the cost for measuring five metrics (although this a common issue across all the methods in this section) and ways of reducing cost are described in a section below. The other issue is that percentage units of gain will not be of equal size between projects in the same way that 1 tonne of carbon dioxide is the same across all projects. If a taxon at a site has only say 10 species, each new species added is a 10% gain whereas if it starts with 100 species then each new species adds only 1%. This means that badly damaged sites produce more units of biodiversity gain for restoration projects than ones which start from a less damaged position. The counter argument is that this encourages restoration investment in the most damaged sites.

Verra - SD Vista Nature Framework

Verra has produced its new SD Vista Nature Framework, an outcome-based standard for issuing of Nature Credits. The framework integrates biodiversity quantification within broader sustainability metrics. A Nature Credit represents 1% of net biodiversity outcomes, measured in quality hectares (Qha), generated as a result of the project intervention. Qha are a combination of ecosystem extent (size of the project area), condition (determined by condition indicators - structure, function or pressure), and significance (i.e. a label that shows how relevant the increase in biodiversity is for aligning with the Global Biodiversity Framework targets).

Monitoring events involve four steps: measuring the condition indicators, standardising them against the condition reference values, calculating the project's condition (mean of the structure and composition indicators), and calculating the area adjusted condition of the project at the monitoring event by multiplying the condition value by the project extent to produce the number of Qhas. Nature Credits are issued based on the percentage difference in Qha between the two monitoring events.

Condition indicators can be defined as: composition, i.e. species richness and abundance, structure, e.g. total biomass, canopy cover, water chemistry, function, e.g. net primary production, rate of leaf litter decay, and pressures, e.g. invasive species, fishing or hunting, land-use change. Each project must include at least three composition and two structure indicators. Inclusion of function and pressure indicators are optional.

The following areas make this standard difficult to apply:

1. The method quantifies steps towards a reference site which is defined as the target level to achieve. Thus, if you had 30 species of Lumbricina in your soil samples in the Amazon, what would be the maximum you could expect in a reference site? This will vary by soil type, so getting that value is hugely difficult and subjective and this is just one taxon; the same must be completed for each taxon. There will always be a temptation to go for the lowest number. Therefore, if the paired reference site had 50 species, the existing site is 60% of the way towards the target, whereas if the reference site had 100 species, the submitted site is only 30% of the way to the target. In the first example, adding 10 species on resurvey gives an additional 20% gain, whilst in the second example it gives you only 10% gain. The advantage of quantifying the biodiversity gain from the baseline (as is done by the Wallacea Trust and many other systems) is that both the baseline and the gain are measured and not estimated as a step towards an estimated total.
2. Species richness is used as one of the inputs with no weighting of species by conservation value. Thus, in an example project protecting pristine forest in Fiji (which has a lower species richness but is home to rare endemic bird species) from being converted to sugar cane field (which has a higher number of common species), the Verra calculations start with the sugar cane field scoring twice as well as the primary forest. At the end of the calculations, a weighting would be given for the forest because it is an IBA (Important Bird and Biodiversity Area) for example, but that may or may not wipe out the difference in the scores.
3. Most of the demand will come from corporates wanting to quantify biodiversity gain through investing in a carbon credit project. They will not want biodiversity credits but verification of the gain and under the Verra scheme there is no way to do this – it is a system just for issuing credits.
4. Experience of dealing with Verra for carbon projects is that they are very slow to respond with two years required for a project to be approved.

Plan Vivo/Pivotal – PV Nature

The PV Nature methodology uses a within-system change approach, comparing a site's biodiversity against its own baseline over time, eliminating subjectivity and biases associated with theoretical or measured references. The methodology calculates five metrics called "pillar metrics"; the pillar metrics are then collapsed into a single value known as a "multimetric". Plan Vivo Biodiversity Certificates are awarded based on the percentage change in this multimetric.

In order to implement the Plan Vivo method, you need to use a private company (Pivotal) which designs the sampling plan for each project within the provided boundaries, with a sampling plan that is generated by a randomised stratification approach (stratified by habitat type). The five pillar metrics are 1) species richness = number of unique species in the target groups at the site); 2) species diversity, used to determine the evenness of species distributions; 3) taxonomic dissimilarity (both taxonomic dissimilarity within each target group, and taxonomic dissimilarity between target groups); 4) habitat health (in terrestrial habitats this is measured by vegetation health and density using the Normalised Difference Vegetation Index (NDVI); the approach to the habitat health pillar has not yet been finalised for marine habitats); 5) habitat spatial structure (for terrestrial habitats the metric is habitat connectivity as measured by the CPLAND Index; for marine habitats the metric is structural complexity as measured by rugosity from a Digital Surface Model (DSM).

The multi-metric is the cumulative sum of the year-on-year percentage changes in the pillar metrics. Four of the five metrics must be measured annually; the fifth metric is measured once every five years. Alongside quantification of biodiversity outcomes, each project has four 'global significance labels' that do not contribute to the certificate issuance but provide buyers with additional information about a project's impacts and quality.

The following areas make this standard difficult to apply:

1. The standard does not allow use of a reference site so the only way to predict uplift on a site is to measure the biodiversity change each year for five years and then use the slope of that change to predict what will happen over the following years in terms of uplift. This assumes that change in biodiversity is going to be linear. If you take arable fields and convert them into shallow wetlands, you will get a massive increase in biodiversity very quickly, but that rate of increase is unlikely to continue over the rest of the project. If you are creating a woodland, there will be an increase in biodiversity as the early secondary stage woodland is created. However, this increase in terms of species numbers will probably decline as the woodland matures and the canopy closes (albeit the species in the late-stage succession woodland will have higher conservation value).
2. For avoided loss projects, you need to leave the threats running for five years to see how much the site declines, so the loss that would occur over the remaining lifetime of the project can be estimated. This seems counterintuitive particularly in cases where the threats are imminent and large, because in these cases much of the biodiversity will have been lost before you are allowed to intervene with protection measures.
3. Species richness is used without weighting of the species for conservation value which can result in endangered species being undervalued.
4. The costs of paying a private company to monitor for five years are considerable and at the point the investment decision is made, the number of credits that are likely to be issued is unknown. This is because in the absence of a reference site to give an indication of the likely uplift or for avoided loss sites, the paired development site, there is no way of estimating the likely number of credits that will be issued.
5. Units of gain cannot be verified independently of the credits, making this an expensive option for corporates quantifying and retiring units of gain rather than wanting to trade credits.

Choice of standards to be used in developing example projects

Of the 50 methods compared in Appendix 1, only one (Wallacea Trust Methodology with verification by the Biodiversity Futures Initiative) fully meets the criteria set out above:

- Is open source and free of charge to use
- Is applicable to all habitats and geographies
- Has independent verification of the size of the claim and issuance of credits is a separate stage with a buffer deducted
- Verification is based on auditing the data rather than auditing whether the method has been applied properly
- Uses multiple taxa to assess change
- Species are weighted by conservation value and relative abundance
- Requires additionality for both uplift and avoided loss projects
- Has a 100-year permanence requirement

Verra also meets most of the criteria but at the time of writing is still in the trial stage and not yet available to be used. It also is not possible to use it as a way of quantifying units of gain to be used for ESG reporting (see Section 2 of this report). Likewise Plan Vivo/Pivotal meets most of the criteria apart from weighting species richness by conservation value. Use of the PV standard though requires Pivotal to be employed annually for five years to monitor biodiversity before any data on likely number of biodiversity credits can be estimated and the system can't be used for quantifying units of gain for reporting purposes without issuance of credits. For these reasons (in particular the need to be able to quantify units of biodiversity gain without having to issue credits which is seen as one of the major markets – see Section 2), the example projects (Appendix 2, Appendix 3a and Appendix 3b) have been described by completing BFI Stage 1 applications using the Wallacea Trust Methodology.

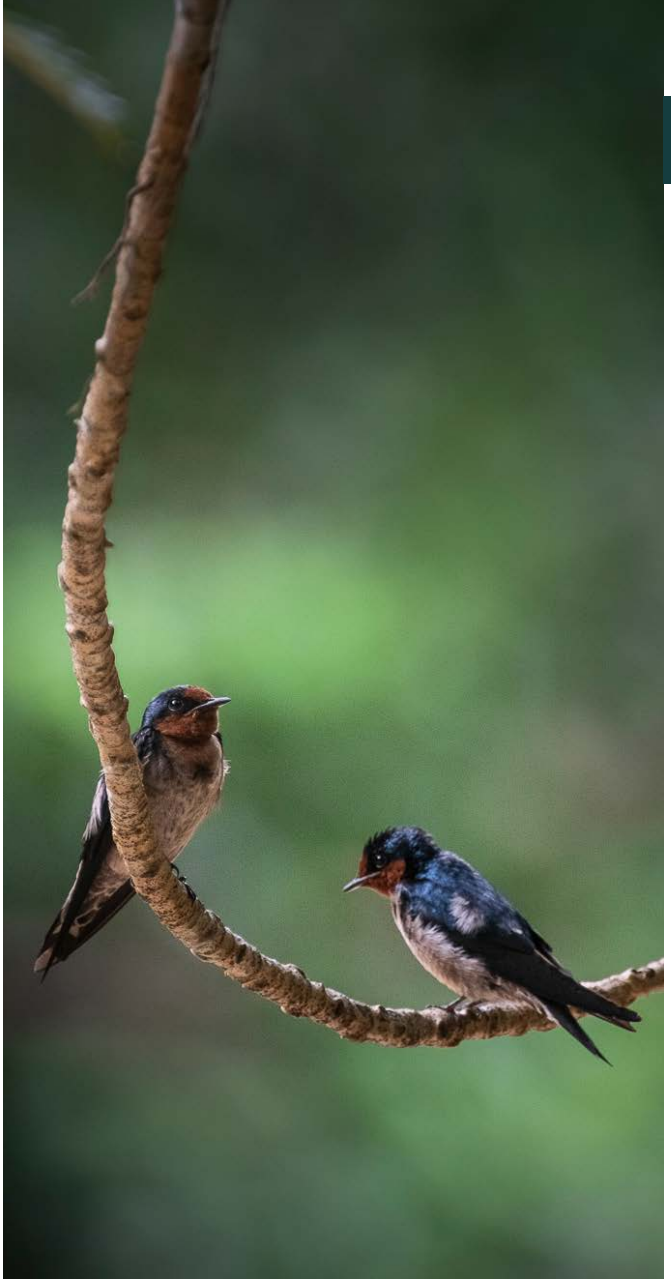
1.4 Costs of data collection and verification

One of the main concerns amongst buyers of potential units of biodiversity gain is the cost involved in collecting and analysing the data. This is where the principle of the taking the data to the scientist rather than the scientist to the data should be used. In a conversation with one of the authors, Accounting for Nature described the huge costs involved in taking multiple scientists into the field which is why they opted for single taxon monitoring methods for the most part. If you use the data to the scientist approach, costs become an order of magnitude lower.

Data collection without requiring specialists

The concept is for the science teams to design a sampling strategy from stratification of the site. Habitat is the main structural determinant for many taxa although there are exceptions such as soil type being the main determinant for soil invertebrates, plant diversity is determined mainly by management practices (meadow or pasture or arable) and soil type, whilst in aquatic habitats the structural criteria that determine the distribution of most taxa may be depth, current speed or water quality and for coral reefs rugosity is a significant structural metric. Sample sites are then identified randomly within each of the strata and local staff at the site are sent detailed instructions on where and how to place traps for various invertebrate surveys, quadrats for plant surveys or camera traps or audio recorders. This is accompanied by a package of the equipment and sample bottles needed for the local staff to gather the data. The local staff are responsible for emptying traps on an agreed timetable and storing the samples in labelled bottles, photographing plant communities within quadrats at What3Words identified sites, and placing and removing camera traps and audio recorders etc. The digital data are returned to the science team to analyse and where possible the invertebrate samples are also returned. There are cases though where sending biological samples across national borders is too difficult and in these cases the analysis of the invertebrate samples is done in country.

Note that not all taxa can be surveyed in this way. For example, obtaining data on the species richness and relative abundance of reptiles needs local ecologists completing active search transects. Likewise, Pollard surveys for butterflies need local entomologists to complete. In many parts of the world the percentage of bird species whose calls have been fully annotated is so low that identification software such as Merlin or Birdnet misses a large percentage of the species. In these parts of the world, local ornithology teams completing surveys with sound recording at the same time is necessary to properly quantify the species richness and relative abundance. In such cases, the central science team recruit the local survey teams and provide detailed instructions on how the surveys should be conducted and the data recorded.



Survey method selection

There are thousands of methods for quantifying different aspects of biodiversity that have been published in the literature and this report cannot cover all of them. There is no magic bullet, and all survey methods have their advantages and disadvantages. When selecting methods the following criteria should be used:

- What is the best method to maximise species records for a particular taxon?
- How is relative abundance going to be quantified over time for each of the species?
- Can the data be collected digitally so there is auditable evidence?
- If data cannot be collected digitally, can photos be taken of the more uncommon species to confirm their presence?

The data from each of the surveys is going to be independently audited, so the more sample and digital data collected the easier the auditing process becomes. Where local ecologists are being used, unusual species recorded on herpetofauna or butterfly surveys should be photographed. As a last resort for auditing, the level of experience of each of the local ecologists used should be assessed.

Auditing the data

In the case of the Biodiversity Futures Initiative, an independent group of academics who verify the claims for biodiversity gain, all the raw data collected for each of the taxa are required. Where metabarcoding (eDNA) has been used, they request all the bioinformatic data, not just the species analysis, all the camera trap, audio data and photographs. They also request all the data sheets and take a sample of the raw data from each taxon to compare against the data sheets provided to check identifications. Once this audit is done then the data for each of the taxa is recalculated and the size of the biodiversity gain verified. Verra will also be using an independent academic peer review process but details of how this will work have not yet been determined since the scheme is not operational yet. Plan Vivo are also using independent academic peer review in the same way as the BFI.

In the carbon world, Validation and Verification Bodies (VVB) are used to verify carbon claims and this involves a field visit. The advantage of carbon is that the audits can be done 3-4 months after the original carbon surveys and the trees will still be there. Repeating a bird or plant survey three months after the original survey may reveal completely different bird and plant communities and tell you nothing about the accuracy of the original survey. If field auditors are to be used, they would need to be deployed with the field teams. Surveys for different taxa are completed at different times of year and time of day (e.g. bat surveys and bird surveys are done at night and dawn respectively). Separate auditors would therefore need to be deployed for each of the different surveys. Nature Plus in Australia use trained auditors for these field visits, but they are concentrating on checking the process (e.g. if surveys are keeping to timed periods and agreed sample sites) rather than concentrating on checking that the identifications being made are accurate. If they were to check the accuracy of the data collection rather than just the process, they would need to be expert in the various taxa they were auditing. The costs of VVB audits are already considerable – if this approach were used with field auditors for biodiversity it would significantly increase the cost of surveys. As a result, the approach of auditing the data (a.k.a. the BFI approach) rather than the process, as for VVB audits, is recommended.

1.5 Uncertainty, leakage and dynamic baselines

Biodiversity credits will be issued based on the number of units of gain that have been verified but reduced by a buffer to allow for uncertainty in the method and any leakage that has occurred since the last issuance.

Uncertainty

Uncertainty is usually measured by calculating the precision of the abundance estimates of each species within a taxon. Uncertainty levels are determined by the number of samples taken and the underlying distribution pattern for each species (clumped, even, random). For any method assessing abundance of different species the confidence levels for each of those species will differ, but the average or median uncertainty level can be used to assess the overall level of uncertainty. An alternative approach used by Accounting for Nature is for a group of experts to determine how accurate each method is going to be (e.g. 80%, 90% or 95%) but the same method applied in different habitats and different component species for the same taxa is likely to produce different levels of uncertainty. Calculating the uncertainty of species richness data is measured by plotting species accumulation (rarefaction) curves.

Leakage

Leakage is when the project activities cause a decrease in biodiversity outside the project site. Any loss of biodiversity caused by the project beneficiaries must be deducted from the biodiversity gain achieved at the site.

Leakage can also occur when the reduction in supply of a floral or faunal product provided from a site where biodiversity changes over time are being quantified is being replaced by an increased supply of this same product from other sites. For example, if a coral reef is being protected from fishing and this reef supplied 1% of the seafood landings for an area then it will be impossible to determine whether there has been an increase in fishing effort elsewhere to cover this shortfall. However, if an area of forest now being protected through biodiversity claims had before the project supplied 20% of the bush meat to a series of villages and this is not accompanied by a reduction in bush meat consumption in those villages then this would be evidence of leakage. In this case, there is an implication that bush meat hunting has increased in other areas to compensate for the loss of the project site area, and a leakage adjustment should be applied. In this example, an estimate needs to be made of the percentage reduction in consumption of bush meat by the villages that were originally supplied from the project site. If the reduction in consumption has gone from 100 tonnes per year of which 20 tonnes was supplied by the project site but is now at 80 tonnes per year, then no adjustment is needed. However, if the consumption is now 90 tonnes per year, then a 50% reduction (i.e. half of the 20 tonnes per year identified to be sourced from the project site before the start of the project) in the biodiversity gains measured for taxa that are directly impacted by this hunting should be applied. Note in this example, there is only a direct impact to taxa such as large herbivores, and other taxa such as higher plants, butterflies, arthropods are not directly affected. In this case we have a 50% leakage rate in one taxon, and so a 10% leakage deduction should be applied (i.e. 50% divided by the number of project metrics, which in this case is 5) to the overall biodiversity value the project developer is using to calculate the units of biodiversity gain from project.

Dynamic baselines

In most systems, a deduction of 20% from the pool of biodiversity units of gain is made for uncertainty plus any further deductions for leakage before biodiversity credits are issued. However, there may also be further deductions if it appears the baseline has altered. In avoided loss projects it might be that the level of threat has declined or increased. Likewise for uplift projects, the assumption that the starting point would remain the same throughout a 25-year period of the project in the absence of the intervention is unlikely to be true. In the carbon world this is tackled by a system of pixel matching. Each 30m x 30m pixel in the submitted site is matched to a site with the same habitat within a 100 km radius. If this was an avoided loss carbon project, the percentage of the thousands of matched pixels outside the submitted site that are deforested at each verification event is then used to adjust the background rate of deforestation. For biodiversity this is much more difficult. Pixel matching can be used to quantify rates of habitat change, but loss of habitat is only one of the threats affecting wildlife. Getting data on herbicide or pesticide usage, invasive species increases, hunting or fishing pressure from thousands of matched pixels is impossible. This is where the development of regional biodiversity hubs could provide the answer by provision of data on overall populations trends for species within the region.

PART 2: DRIVERS OF DEMAND, MONETISING BIODIVERSITY AND EXAMPLE PROJECTS

2.1 Drivers of demand

There are two different types of demand – a compliance market and a voluntary market.

Compliance Markets

A compliance market is where there is legislation in position that requires biodiversity offsets to be developed to compensate for losses in proposed development schemes. For example, the Biodiversity Net Gain policy in England legally requires developers to ensure that their new developments result in a measurable improvement (by at least 10%) in biodiversity compared to the site's pre-development condition. The Mitigation Hierarchy is a key principle of Biodiversity Net Gain, with the first priority to design a project to avoid impacts on biodiversity as much as possible, minimising impacts where they are unavoidable and restoring habitats that were temporarily disturbed. Insetting, where a developer restores habitats on their own land as a way of providing offset enhancements is the suggested next step in most mitigation hierarchies, which leaves purchase of off-site enhancements as a last resort. This final step requirement for off-site habitat creation and enhancement creates demand for biodiversity banks (wildlife restoration or conservation projects that can be purchased by developers to provide offsets). None of the SE Asia countries examined have compliance markets where the losses and gains are measured in agreed units of biodiversity gain.

Voluntary Markets

The voluntary market for biodiversity credits barely exists, with a maximum of $8 million worth of credits traded to date worldwide. However, there is huge interest internationally in attracting private sector investment into wildlife conservation and the need for such investment has been identified as crucial to providing the funding for the world to meet the Kunming-Montreal Global Biodiversity Framework targets. However, progress in this direction has been slow. A business case for companies about why they should provide additional support for nature beyond the occasional philanthropic donation has not been made.

The most likely route for a business case to be made is through governmental reporting requirements, and this has already started in some countries. Large corporates trading with the European Union are required under the European Sustainability Reporting Standard (ESRS) to publish their ESG (Environmental, Social and Governance) reports on a range of topics, including biodiversity and ecosystem impacts. This scheme was implemented from 2025 for large EU listed companies, banks and insurance undertakings with more than 500 employees, and large non-EU listed companies with more than 500 employees. From 2027, listed 'Small and Medium-sized Enterprises' will be brought within the system, although they can delay implementation for a further two years. This mandatory ESG reporting within the EU is likely to spread to other markets and if similar reporting requirements on companies operating within SE Asian countries were introduced by legislation, this would be a major driver of demand for the private sector.

In parallel with these governmental initiatives, there is a drive from many of those within the private sector to 'do the right thing' even without reporting requirements and show progress by investing in nature without being forced to do so by new legislation or reporting requirements. For example, 243 corporates have agreed to report their nature impacts in line with the Task Force on Nature-related Financial Disclosures (TNFD) recommendations by 2025. The Science Based Targets Network are a group of leading corporates who are developing advice for how companies should start reporting and measuring biodiversity for their operations.

Both the compliance and voluntary markets need agreed units of quantifiable biodiversity gain to function efficiently and attract investment. When creating legislation to govern both compliance and voluntary markets, great care must be taken to ensure perverse incentives are not created that inspire local communities and project developers to destroy habitat in order to then receive funding to restore it (see 'Creation of perverse incentives' in Section 2.3).

2.2 Monetising biodiversity

There are two main ways in which biodiversity can be monetized: directly or indirectly.

Indirect monetisation: 'Carbon plus'

The indirect method involves the value and appeal of a carbon credit being enhanced by quantifying the units of biodiversity gain that are being achieved from the carbon project

Traditionally in the carbon markets, the Climate, Community and Biodiversity Alliance's (CCBA) standard has been used to indicate that a project is incorporating some aspects of both community and biodiversity improvement. However, this standard does not quantify the overall increase in biodiversity; compliance with the standard could be achieved with a minimal increase in biodiversity value and there is no way for the market to decide between a project that has a large increase in biodiversity and one which has minimal impact on biodiversity.

The advantage of the developments in methodologies that quantify units of biodiversity of gain is that carbon developers can now quantify the benefits to biodiversity of their nature-based carbon credit projects. A buyer of carbon credits from such a project can claim that they are sourcing their carbon credits from a high integrity project that has produced, for example, a 50% increase in biodiversity. The greater the increase in biodiversity, the greater the appeal and monetary value of the carbon credits. Quantification of this gain is becoming increasingly important even without monetisation of those units, because of increasing biodiversity reporting requirements. Example Project 1 described below is a mangrove restoration project in SE Sulawesi, Indonesia where the project is funded entirely by carbon, but the buyer can also report the units of biodiversity gain associated with those 'carbon plus' credits in their ESG reports.

Direct monetisation: Biodiversity credits

Using carbon to finance a project is limited to those ecosystems where there is sufficient carbon to fund the project entirely. There are many projects and ecosystems where this will not work because carbon is limited. These range from avoided loss projects on grasslands where there is some carbon but at least 50% of the finances would need to come from biodiversity credits, through to wetland creation or coral reef avoided loss or uplift projects, where there is so little carbon that 100% of the income would need to come from biodiversity credits. Example Project 2 below describes how a coral reef project in Sabah, Malaysia could be funded through biodiversity credits alone.

It is important to distinguish here between biodiversity units of gain used for ESG reporting and those used to generate biodiversity credits. The number of biodiversity credits issued needs to be reduced by a buffer to allow for method uncertainty, possible annual variations and any leakage. The number of biodiversity credits issued will generally be at least 20% less than the number of units of biodiversity gain.

There are three main issues stopping the biodiversity credit market from taking off: lack of agreement on a unit of biodiversity gain, lack of data on biodiversity credit pricing and no clear business case for corporates to invest in nature.

Lack of agreement on a unit of biodiversity gain

The lack of international agreement on the unit of gain (comparable to the 1 tonne of carbon dioxide equivalent for carbon projects) is a major stumbling block. Despite numerous international discussions (through the International Advisory Panel on Biodiversity Credits, Biodiversity Credit Alliance, World Economic Forum, etc), none of them have come up with a full agreement on a quantified unit of gain. The Biodiversity Credit Alliance definition of a credit does not include any quantifiable units of change or area and refers just to projects that have a positive biodiversity impact with additionality and permanence. Within this broad umbrella definition, all of the methodologies listed in Appendix 1 could be included. However, if each of those methods were applied to the same site where there was an increase in biodiversity, the size of that increase estimated by the different methods would vary enormously between them, since their units of output are very different. The BCA definition in theory would allow a 1% increase in a single species over 10m² to be issued as a credit. Measuring changes of just one species at a site is highly unlikely to reflect an overall increase in biodiversity when compared to methods that measure changes in all species for at least five taxa. The more species and their abundances measured at a site, the more reliable the assertion that there has been a true increase in biodiversity at that site.

However, the market is beginning to resolve this and the definition of a unit being a 1% gain in the median value of a basket of at least five metrics that reflect the conservation objectives for the submitted site, with additionality and permanence is currently seen as the highest quality definition on the market place and the Dow Jones Opis weekly biodiversity reports show more units of gain and credits being produced with this unit definition than any other definition.

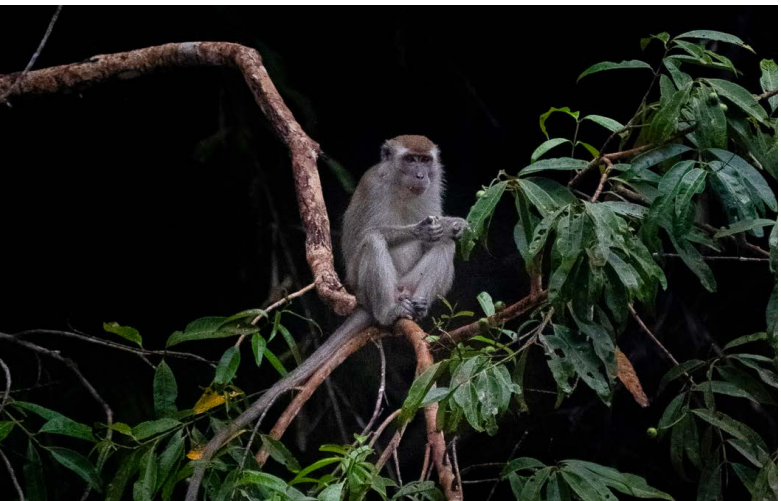
There is a lack of price discovery

The second issue is one of price discovery. If a carbon project is submitted for funding, the fund manager will want to know how much the carbon credits will be produced for and will make a decision based on whether they think that the future prices of carbon will be high enough to produce a good return. Investment funds can't make the same decision for biodiversity credits because there are no price data available.

How can price data be produced for biodiversity credits without commercial investments in projects to produce these credits? This is where philanthropy, regional development banks and public money can play a crucial role in igniting the market. Donations and soft loans are funding wildlife conservation projects because they think they are worthwhile in their own right. If the biodiversity benefits of these philanthropic or government funded projects were quantified and the donor offered biodiversity credits as the biodiversity accumulates (or was not lost, in an avoided loss project), they could then sell those credits and reclaim their original gifted sum. This would not just provide a unique selling point for philanthropic projects, but since there are traders already asking for biodiversity credits to trade, it would allow resale prices to be recorded. Only when there is price discovery from sale of biodiversity credits from philanthropic or government funded projects will it be possible to take the next step and raise commercial investments for biodiversity projects.

There is no clear business case for investing in biodiversity

The third issue, restricted demand for biodiversity credits, was discussed in Section 2.1 with some suggestions as to how government interventions could help stimulate demand.



2.3 Supply of biodiversity credits - example projects

The leading independent verifiers of biodiversity claims (Verra, Plan Vivo and the Biodiversity Futures Initiative) have coalesced around a multi-metric definition for a unit of biodiversity gain – *a 1% gain per hectare in the median value of a basket of five metrics that reflect the conservation objectives of a project with additionality and permanence* (see Section 1). It is therefore recommended that this unit of gain definition is used, and two example projects in SE Asia are described that demonstrate how their biodiversity value can be monetized.

At the time of writing, Verra is not open for accepting new projects and Plan Vivo require the appointment of a private company (Pivotal) to advise on how the applications should be structured. The example sites have therefore been presented in the format required for approval through the Biodiversity Futures Initiative but could similarly be submitted to Plan Vivo or Verra when they are ready to accept applications.

Project selection

Whilst in theory any terrestrial, freshwater or marine habitat could be monetized using the approach outlined in the examples below, in practice there are a few issues to consider when selecting projects to monetise:

- ### Size of the project in hectares
  The number of units of biodiversity gain are achieved by multiplying the size of the predicted biodiversity gain (as a percentage) by the area in hectares. Thus, if you have a 300% predicted median uplift or avoided loss and the site is only 100 hectares, there will only be 30,000 units of gain and with the buffer deduction this will only allow 24,000 biodiversity credits to be issued. If biodiversity credits are providing all or a substantial part of the income needed for the project, the price per credit would have to be very high to support the income required with so few credits available. In general, look for projects with larger areas (>1000 hectares), where the price to be charged for credits can be <$20.

- ### Look for high levels of existing biodiversity for avoided loss projects and damaged habitats that can be restored for uplift projects
  Both are likely to give the highest percentage gains either from avoided loss or uplift. A higher percentage difference compared with a project that has a smaller predicted gain and the same area in hectares will produce more credits and therefore enable the sale price of the credits to be kept within reasonable bounds.

- ### There has to be strong additionality.
  This could be restoring a habitat that would not occur naturally without removal of the threats that are preventing this natural recovery, or in the case of avoided loss projects, preventing the imminent threats that would threaten the existing high levels of biodiversity.

- ### Look for projects that have a strong story attached to them
  There is little emotive attachment to a tonne of carbon dioxide, yet we already see massive price differentials in the carbon credit markets based on how that credit was produced (a wind farm avoided emission credit will get much lower prices than a nature-based ecosystem restoration project, for example). The public has a much higher level of emotional attachment to biodiversity, and restoring or conserving wildlife reserves is generally regarded as a worthwhile activity. Avoided loss carbon projects have suffered massive price reductions because of perceived weakness on the underlying rates of deforestation, to such an extent that funding an avoided loss carbon project is currently virtually impossible. However, this is not the case for protection of highly biodiverse nature reserves, and it is likely that the first projects to utilise biodiversity credits will be those that protect threatened wildlife sites.

- ### Ensure interventions are likely to be effective
  Whatever management interventions are proposed, ensure they are likely to result in either protection of or improvement in the biodiversity of the siteIf there are threats to the submitted site beyond the control of the project proponent, then the project may fail. This is a common issue encountered by river-based projects, where upstream polluting impacts are beyond the control of the project.

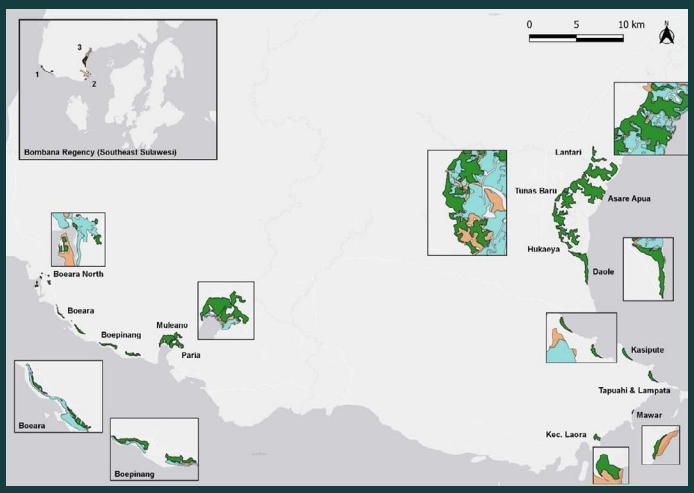
- ### Find projects that benefit both carbon and biodiversity
  If the project benefits carbon as well as biodiversity, this helps enormously with obtaining funding since the carbon predicted income helps to underwrite the project.

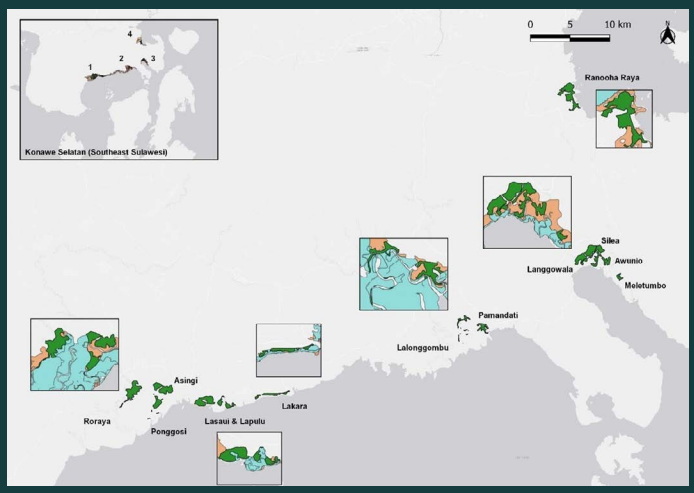
- ### Plan projects that meet national and international biodiversity goals
  If a project can be linked to a country's 30 x 30 targets this will help with attracting better prices for the credits.

EXAMPLE PROJECT 1:
CARBON CREDITS WITH QUANTIFIED BIODIVERSITY UPLIFT IN SOUTHEAST SULAWESI, INDONESIA

This project is aiming to restore mangroves in 2000 hectares of abandoned fishponds in SE Sulawesi, Indonesia. The abandoned ponds are on APL (village owned land) and will be purchased from the owners by Trusts that will then return the land to the ownership of the community. The hydrology will be adjusted so that the areas to be restored are once again connected to tidal flows. These areas will be replanted with mangroves reflecting the species found at different tidal heights.

The project is funded by carbon credits, but the biodiversity impacts of this restoration will be quantified using the Wallacea Trust Method and with independent peer review by the Biodiversity Futures Initiative, so that the buyer of the carbon credits can claim that they are sourcing their carbon from nature-based projects that are producing, for example, a 50% increase in biodiversity. An example BFI application for the project is included in Appendix 3a.





The reference site used for this project will be the intact mangrove areas adjacent to the areas being restored to mangroves. The metrics used to quantify the biodiversity gain will be:

3D Structure

This will be measured either by multispectral drones and photographs or backpack LIDAR to determine the physical complexity at different heights in comparison to intact mangroves.

Birds

It is possible there will be a decrease in feeding waders and ducks as the exposed areas of sediment are reforested. However, there should also be an increase in other breeding birds as the mangrove is restored. Point counts with simultaneous audio recordings will be completed four times a year to quantify the overall changes in bird species richness and abundance.

Crustacea

Crab activity facilitates organic matter cycling in mangroves as these crabs bury the detrital matter in mangrove sediment, thus slowing down the export of detrital matter out of the mangrove ecosystem. Tripod mounted video recording of quadrats will survey sesaramid and fiddler crab diversity and abundance during low tide periods in both the wetter period and the drier season.

Molluscs

Gastropods and bivalves are key sources of food, habitat and shelter for fish and shellfish communities, serving as good indicators of overall ecosystem health. Mollusc (malacofaunal) species richness and abundance will be monitored by completing five core samples at each site in addition to using a 10m x 10m quadrat for an active search of any molluscs living on the surface or epiphytically on mangrove trees.

Juvenile Fish

An increase in fish recruitment because of the additional mangrove areas is expected, and this will be monitored using fish traps to survey the species richness and abundance of fish fry populations on the five nights closest to spring tides.

Reptiles

The Wallacea region contains a number of endemic reptile species some of which rely on mangroves as key habitat. Reptile species richness and abundance will be surveyed using standard time active searches and photographs of transects.

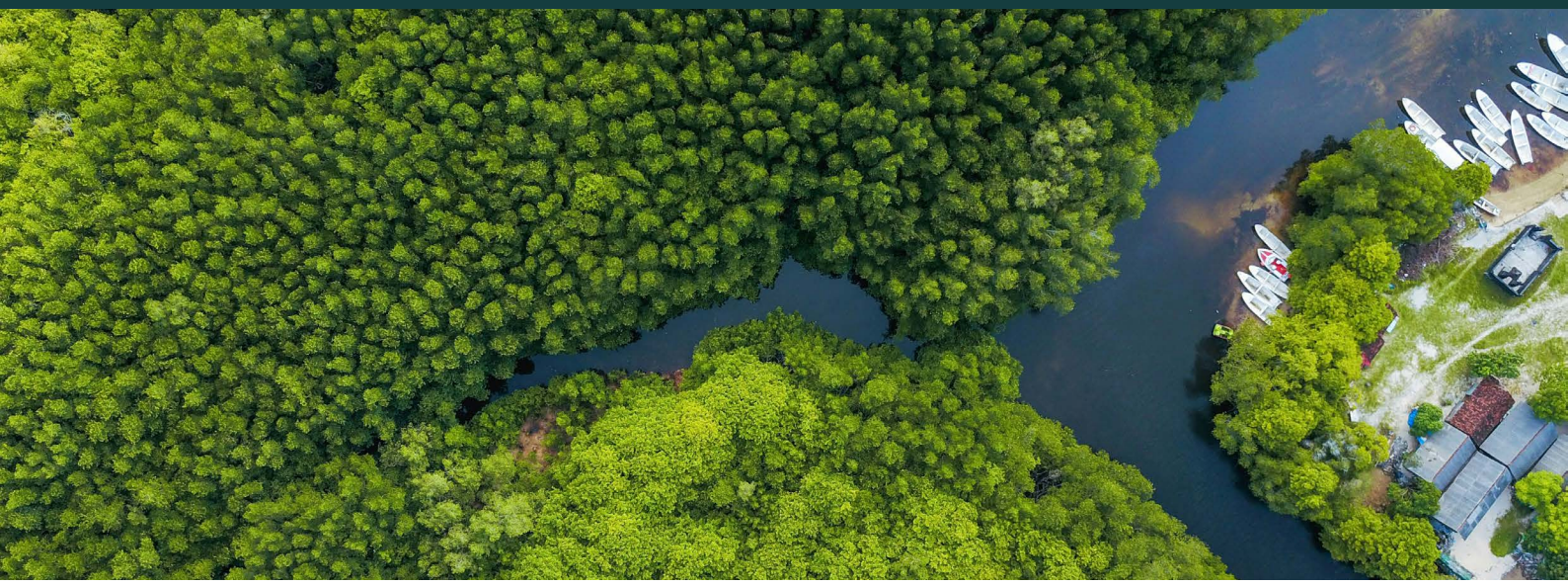
Financial structure of the project

- 15% of the credits are donated to the Indonesian Nationally Determined Contribution.
- 10% tax is paid on all voluntary carbon credit projects. The Indonesian government will receive $17 million from the NDC donations and taxes over the project lifetime.
- A $10 million private sector investment is required to start the project, and the investor will get a 12% IRR.
- 70% of the total value of the project is paid to local stakeholders (owners, users and managers), totalling $85 million over the 40-year project lifetime. This scheme works because the carbon credits produced are the highest quality with independently audited benefits to local stakeholders and quantified biodiversity gains.
- If the same approach was used to restore half of the area of destroyed mangroves in Indonesia, this would bring $2 billion of income to coastal communities.

The biodiversity benefits of this project could be brought to market via the carbon funded project which is currently under review by the Indonesian SRN. There is a very high demand for blue carbon credits with 60% benefits going to local stakeholders and quantified units of biodiversity gain, so selling this project should not be a major issue. See Appendix 3b for more information.

Demand for mangrove restoration projects

- The Business Alliance for Scaling Climate Solutions (BASCS) was recently formed by major corporates including Meta, Salesforce, Amazon, Microsoft and others. One of its objectives is to source high quality carbon credits from restoring 50% of the world's lost mangroves by 2030.
- High quality credits are defined as significant benefits to local communities and quantified biodiversity gains, and BASCS has committed to paying fair prices for high quality mangrove restoration credits ($50+). There is a huge demand so prices could be much higher.



The second example (Appendix 4a) is a Malaysian reef system which forms part of a Marine Protected Area, but which is still subjected to international trawlers and significant artisanal fishing pressure. Here the local fishers will receive financial compensation for not fishing plus investment in fish culture facilities on their island and investment in radar and rangers to police the reefs. This project would be funded entirely from issuance of biodiversity credits as the reef systems recovered. Appendix 4b contains an example set of budgets that could be offered to philanthropists as a way in which they can both support this project and kick start biodiversity credits.

EXAMPLE PROJECT 2:
HOW BIODIVERSITY CREDITS CAN FUND CORAL REEF CONSERVATION IN SABAH, MALAYSIA

rePLANET has partnered with Marine Research Foundation, Sabah, to design a pilot project showing how coral reef protection can be funded by biodiversity credit in Malaysia. The project consists of 9,535ha of coral reefs close to Tigabu Island off the coast of Sabah.

The project area lies within the Tun Mustapha Marine Park (TMP), which was established by Sabah Parks in 2016 and is the largest multiuse Marine Protected Area in Malaysia, covering 898,762ha including mangroves, seagrass beds, coral reefs and pelagic habitats.

Most of the site lies in a 'Community Managed' zone of the Park, where non-destructive small-scale and traditional fishing activities are allowed and nearby communities can take part in managing the natural resources. A smaller proportion of the site lies in a 'Preservation Zone', which is protected from extraction for conservation purposes. However, neither of these zones are currently well enforced, and the Park currently has limited resources to protect its coral reefs. Habitats and marine life in TMP are threatened by a suite of human activities, including overfishing, destructive fishing, unsustainable coastal land uses, and illegal harvesting of marine turtles and eggs.

Using the Wallacea Trust Methodology with validation through the Biodiversity Futures Initiative, five metrics will be calculated:

1. 3D structural complexity and rugosity of coral reefs
Scleractinian corals are the primary reef builders and ecosystem architects of coral reef ecosystems. As they grow, they lay down a hard calcium carbonate skeleton which provides three-dimensional structure that is exploited as feeding and breeding grounds, and shelter by other reef-dwelling taxa such as fish and macroinvertebrates. Higher structural complexity of the reef supports greater biodiversity by providing more habitats and enhancing resilience to environmental stressors. This is measured by creating a 3D map using structure-from-motion photogrammetry.

2. Percentage coral cover
Estimates vary, but a healthy reef in the Indian Ocean would be expected to have a coral cover of 40-60%, although rates of loss have been accelerating in recent decades as a result of rising sea surface temperatures and overfishing. Percentage cover of hard coral will be measured using video point intercept line transects.

3. Species richness and relative biomass of piscivorous fish
An increase in piscivorous fish within the project area indicates a thriving food web, which is a hallmark of a healthy marine ecosystem. Their species richness and biomass will be surveyed by filming transects along depth contours using a Stereo Video System.

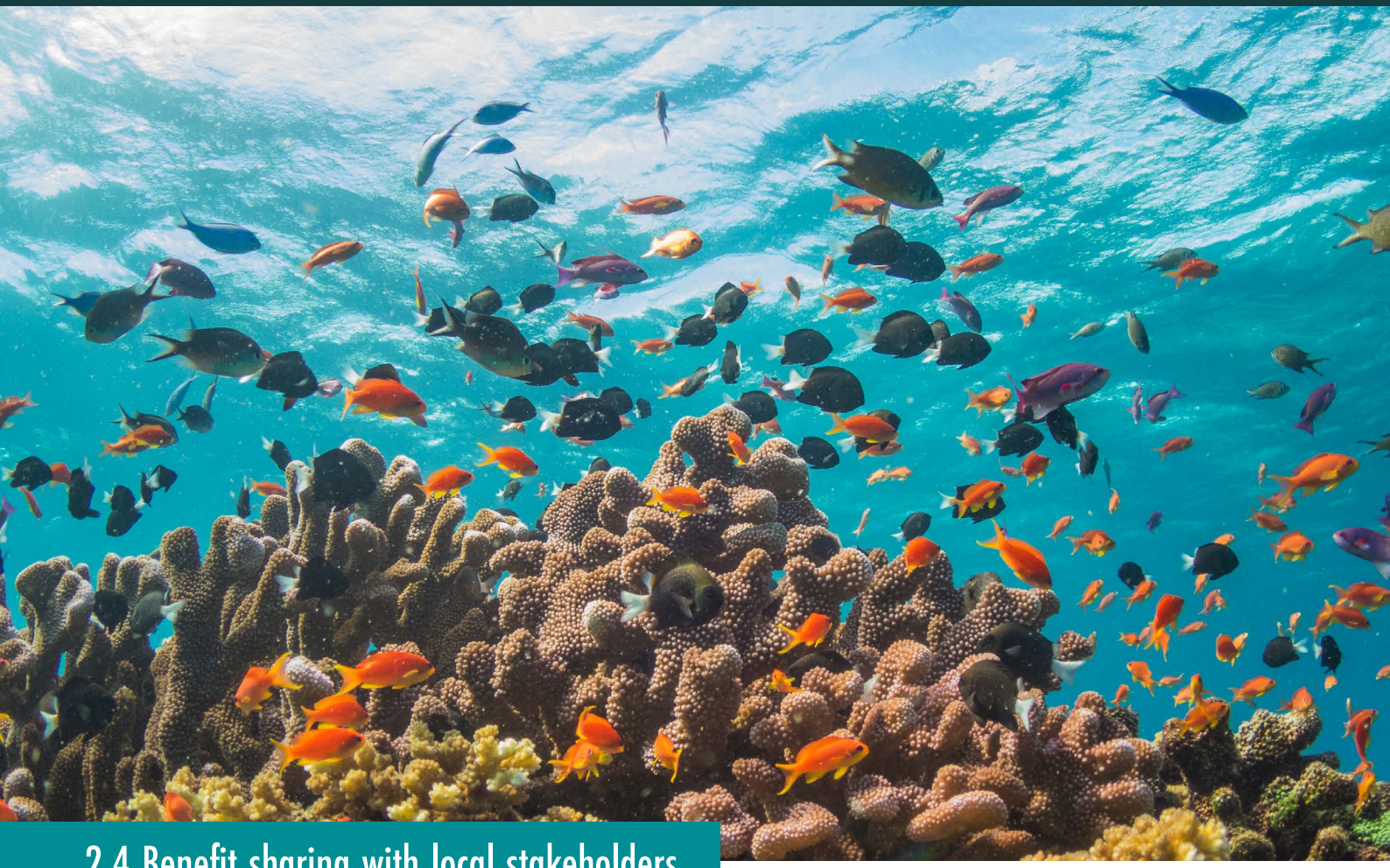
4. Species richness and relative biomass of herbivorous fish
Healthy populations of herbivorous fish contribute to the resilience of coral reefs, enhance the overall biodiversity by supporting a variety of marine species, and help maintain the ecological functions of the reef system. Their species richness and relative biomass will also be surveyed by filming transects along depth contours using a Stereo Video System.

5. Species richness and biomass of commercially exploited invertebrates
Commercially exploited invertebrates on coral reefs, such as lobsters, crabs and sea cucumbers, are vital to ecosystem functioning. Many reef invertebrates are harvested for food, medicinal use, and aquaria, and declines in their populations indicate overexploitation, leading to ecosystem imbalances. Their species richness and biomass will be surveyed by divers using belt transects.

The data from baseline and regular monitoring of the reefs for each metric will be provided to the Biodiversity Futures Initiative to verify the claims.

If the median value of these five metrics increases by 300% over the 30 years and a linear rate of recovery is assumed, then this project will generate 2.3 million biodiversity credits (see Appendix 4b with the budgets for this project). If those credits were sold at $18 plus 3% annual inflation, then it will generate $68 million over the 30 years of the project. 60% ($41 million) is paid to local stakeholders either through wages or locally agreed project funding. The project needs an initial investment of $2.78 million and the investor gets a share of the credits issued and makes a 26% internal rate of return (IRR) on their investment.

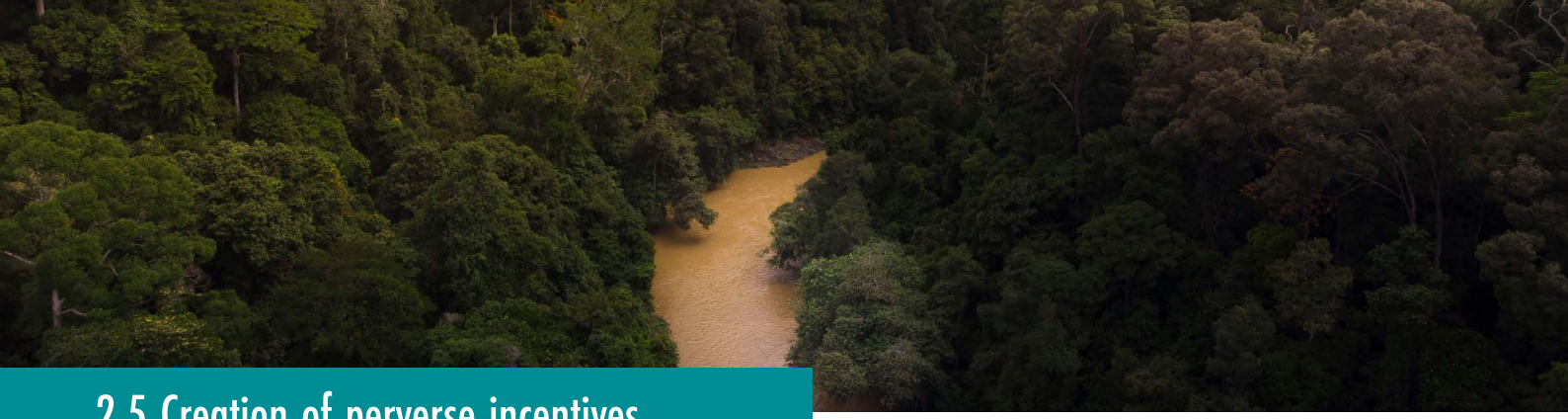
There is no legal impediment to this project being launched on the market after agreements are reached with Sabah Parks Authority and the proposed operator (Marine Research Foundation). However, since this example is funded by biodiversity credits alone the funding is likely to come from philanthropists who consider it a worthwhile project in its own right. The philanthropists would be issued with biodiversity credits after verification of the units of gain, and would be able to sell those. Prices for the resale value of these credits have been deliberately kept low to ensure that there will be buyers and the initial donation sum will be returned in full together with a reasonable IRR for a project using a novel financial instrument like a biodiversity credit.



2.4 Benefit sharing with local stakeholders

One of the main risks for buyers is that they may pay a high price for carbon (e.g. $50) and then are exposed in the Press as having sourced their carbon credits from projects that are providing very small benefits (e.g. $10 per credit). This will be portrayed as exploitation or colonialism and the benefits of buying high quality credits to offset some of their emissions will be undone by the reputational damage to the company. Some project developers (e.g. rePLANET) require that all of their projects produce carbon with quantified biodiversity units of gain where 60% of the final value of the project (i.e. total income over the project lifetime which includes the initial investment plus the income raised from selling the carbon credits) is paid to local stakeholders (owners, users and managers). In their case they use Fair Credits, which is an independent group of academics who verify claims of financial benefits to local stakeholders by examining the budgets and income raised from credit sales.

One of the tricks used by rogue carbon project developers is to quote the percentage benefits to local stakeholders from the baseline budgets only. However, project developers are not selling the credits at the same price that they cost to generate, but are making a profit on each credit sale. Best practice is to ensure that the percentage that is committed to local stakeholders should also apply to the profits made from selling credits. This should apply to biodiversity credit project budgets just as for carbon projects.



2.5 Creation of perverse incentives

The section below describes a project in Sumatra on village owned land that was submitted to rePLANET as part of a call for projects. The objective from the developers was to use the combined income from carbon and biodiversity credits to fund the restoration of agroforestry. This is an example of where a perverse incentive could be created if such a scheme were to be funded. The area to be planted has been cleared of forest within the last 10 years so would be ineligible for restoration anyway under most carbon schemes. These restrictions are placed on carbon projects to discourage others from clearing new areas of forest in the hope that they will also be able to benefit (this would be leakage and any carbon losses would need to be deducted from the new carbon obtained from the agroforestry scheme). In this case the biodiversity leakage impacts would be the same as for carbon (loss of native forest wildlife), so the same rule should apply as for carbon in order to avoid perverse incentives.

What happens if the land was cleared more than 10 years previously? If native forests are to be restored, then an absolutist position on never restoring areas that have been cleared, even if >10 years previously, is impossible to take. In these cases, it is arguable that the landowners should be required to restore native forest on a large percentage of the cleared area (e.g. 75%) and only be allowed the remaining areas to be used for agroforestry. In these cases, the landowners would be paid to restore the native forest areas (planting and maintaining the trees until they were established) and after establishment would be paid an annual sum from carbon credits with biodiversity either sold indirectly or directly as credits to continue protecting the restored forest for the duration of the carbon project and beyond.

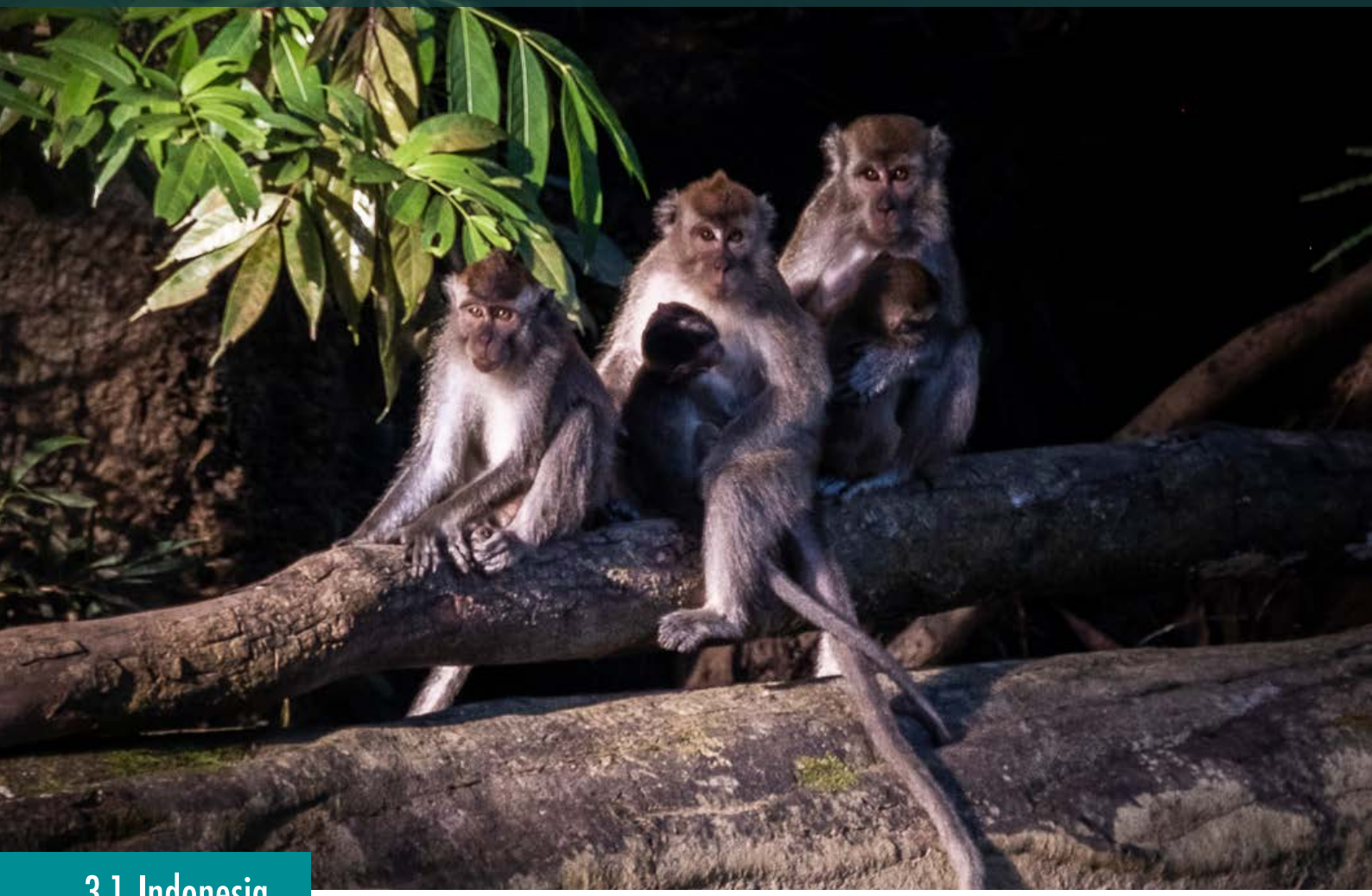
RAINFOREST RESTORATION IN SUMATRA, INDONESIA

This is a project application to assist a badly managed community forest concession. In the 25 years since the community achieved control of the concession, nearly all (except around 1000 hectares) of the forest has been logged and converted into garden areas for individuals within the communities. The gardens are used for a mix of agroforestry and/or arable crops. The original intent of the community agreement was for them to have sustainable extraction rights for timber and non-timber projects within the forest, but this agreement has not been enforced, and the forested area has continued to be destroyed.

The application was for the issuance of carbon and biodiversity credits to fund significant expansion of agroforestry products on the garden areas. This would create a perverse incentive because the community would then gain a significant financial benefit from having illegally cleared the forest areas. The funding from the credits would have funded the labour costs for growing the seedlings, planting out and maintaining them and the individuals whose areas they were planted on would then receive the benefits. In reality, any area cleared within the last 10 years is not eligible for carbon credits, and it is suggested that this should also be the case for biodiversity credits (see Recommendation 6).

Part of the application suggested an avoided loss project for the remaining 1178 hectares of forest. Here avoided loss biodiversity credits (see example above from a Malaysian reef) could help fund the protection of that remaining forested area so the community could see a benefit from maintaining the forest. Avoided carbon loss credits could also be used to fund this project, but the prices achieved for credits on the reputationally damaged REDD+ market would not be worth the effort at this scale. However, the remaining forests contain some iconic species (orangutan, pangolin, gibbons, siamang, helmeted hornbill) and their protection may attract interest from philanthropists. If the difference in a group of metrics (3D structure of the canopy, tree species richness and abundance, arboreal mammals, breeding birds and herpetofauna species richness and abundance) between these remaining forests and the damaged parts of the village concession had a median difference of 500%, then the project could generate 500 x 1178 (hectares) x 0.8 (buffer deduction) = 471,200 biodiversity credits if the forest biodiversity could be maintained over a 25 year period. That would be equivalent to 18,848 credits per annum and at $15, a credit this would generate over $250,000 a year to support ranger and other protection activities. This would provide an incentive for the remaining forest to be protected and encourage other community forests to protect their remaining forests as a potential income stream from biodiversity credits.

PART 3: LEGAL AND POLICY REVIEW



3.1 Indonesia

Indonesia has not yet established a dedicated national framework or registry for biodiversity credits, and the country faces regulatory gaps that limit the scalability of biodiversity credit mechanisms. Unlike carbon credits, which are regulated under frameworks like Presidential Regulation No. 98 of 2021 concerning Carbon Pricing (PR 98/2021), there is no equivalent policy governing biodiversity credits.

All laws and policies related to biodiversity credits in Indonesia have been reviewed. There are three keys areas that require focused attention and regulatory development:

1. The Government asserts the rights to biodiversity even on private land
2. There is no compliance legislation requiring new projects that destroy habitats or species to replace that loss elsewhere
3. There is a well-developed system for projects needing to register carbon that could be modified to include biodiversity credits

1. The Government asserts the rights to biodiversity, even on private land

Article 33 of the 1945 Constitution of the Republic of Indonesia (UUD 1945) stipulates that: "The land and waters and the natural wealth contained in it shall be controlled by the state and utilised for the optimal welfare of the people." The scope of state control over land is further elaborated in Law No. 5 of 1960 concerning Basic Agrarian Principles which establishes the right of the state to grant the authority to regulate and administer the allocation, utilisation, provision, and maintenance of the earth, water, and airspace.

The Indonesian Government therefore has the power to regulate the activity of biodiversity protection and conservation including activities conducted by any legal entity, including private parties, which must have a legitimate license/approval from the government.

Based on the Government's approach to carbon credits—where project developers are tied to license or permit holders—it is likely that biodiversity credits could follow a similar model. This would mean that entities with licenses for activities like managing conservation areas or utilising genetic resources may be granted the right to generate and hold biodiversity credits.

Currently, biodiversity credits generated from privately owned lands, community-managed areas, or degraded lands undergoing restoration lack specific legal recognition or guidance regarding their ownership, trading mechanisms, or the parties responsible for their generation and verification. This gap creates uncertainty for stakeholders who may wish to engage in biodiversity conservation efforts outside state-designated zones, leaving them unclear about their rights to monetise such activities.

For biodiversity credits to be validly sold and purchased by different entities, the initial sellers must demonstrate that:

- The seller holds the underlying legal rights;
- The seller possesses legitimate documentation or approval to conduct the activities; and
- The seller is entitled to own the biodiversity credits.

To facilitate this process, it is crucial for the Indonesian Government to provide clear and comprehensive guidance on the regulatory framework for biodiversity credits which includes the clarification on who holds the legal rights to biodiversity resources and credits including in cases involving public lands, Indigenous territories, or community-managed areas.

2. There is no compliance legislation around biodiversity

There is no compliance legislation requiring new projects that destroy habitats or species to replace that loss onsite or elsewhere. There is currently limited funding from ESG (environmental, social and governance) departments for conservation projects, therefore introducing compliance legislation for corporates operating in Indonesia is included in Recommendation 2.

3. There is a well-developed system for projects needing to register carbon that could be modified to include biodiversity credits

Indonesia has established a regulatory framework for carbon trading through PR 98/2021 and its implementing regulations, which include the mechanisms for developing and trading carbon credits. However, the current legal framework does not specifically address the integration or differentiation of biodiversity credits within carbon-related projects. This omission leads to uncertainty regarding the treatment of carbon and biodiversity outcomes generated by the same project.

Carbon pricing regulation in Indonesia is a system where companies must pay a tax per ton of CO_2 emitted. Additionally, government sets a limit on how much CO_2 companies can release. If a company emits less than its limit, it can sell its extra emission allowance to another company that exceeds its limit. This creates a carbon market where companies trade emission credits. Companies can also invest in carbon sequestration projects to offset their emissions on the voluntary carbon market.

The Indonesia Carbon Exchange (IDXCarbon), the country's national carbon trading platform, was launched in 2023. Companies can buy and sell carbon credits from projects that reduce emissions, like reforestation and renewable energy.

The National Registry System for Climate Change (SRN PPI) is the key platform for monitoring and reporting climate actions, including tracking carbon credits. As of now, biodiversity credits are not regulated under a unified national framework like SRN PPI, but the same system could be used to standardise, register, and monitor biodiversity initiatives and credits.

Other relevant legislation

Interest in biodiversity credits in Indonesia

Presidential Instruction No. 1 (2023) concerning Mainstreaming of Biodiversity Conservation directs ministries, institutions, and regional governments to coordinate efforts to mainstream biodiversity conservation. The Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2025-2045 includes targets for the development and strengthening of financial support for the implementation of biodiversity restoration and protections, which should involve the private sector, the reduction of negative impacts of business operations on biodiversity, and incentive reforms to support biodiversity management. Biodiversity credits will be crucial to achieving these targets. Indonesia is also committed to the Kunming-Montréal Global Biodiversity Framework which highlights biodiversity credits as an important mechanism for financial resource mobilisation.

Benefit sharing with local communities

Under Law No. 11 of 2013, Indonesia has ratified the international Nagoya Protocol which establishes a framework for the fair and equitable sharing of benefits arising from the utilisation of genetic resources, emphasising the need to ensure that free, prior, informed consent (FPIC) and mutually agreed terms (MAT) are obtained before resources are accessed. Though the FPIC concept is included in the National Biodiversity Strategic Plan, it does not provide clear guidance on the implementation of access and benefit-sharing.

Additionally, Law No. 5 of 1990 concerning the Conservation of Biological Natural Resources and Their Ecosystems has undergone significant amendments to enhance conservation efforts. The recent revision, Law No. 32 of 2024 mandates both central and regional governments to provide adequate and sustainable funding for conservation activities, and are responsible for equitable distribution of benefits derived from the sustainable use of natural biological resources and their ecosystems.

To enhance biodiversity credit markets, safeguards for Indigenous Peoples and local communities including FPIC and benefit sharing mechanisms should be built into national policies on biodiversity credits.

Recommendations specific to Indonesia

1 Clarity on legal rights and processes for generating biodiversity credits

There is a strong interest from both government and project developers for a biodiversity credits market to be developed in Indonesia. Provide clear guidance for biodiversity credits projects, including legal status on ownership and legal rights for projects developed in both designated areas and other land types, including privately owned lands and community-managed areas. Guidance should also be provided for the processes for generating, trading, and monitoring biodiversity credits and benefit sharing with local communities.

2 Standards and compliance legislation

Introduce compliance legislation and set clear standards for biodiversity credit creation and verification, in line with international best practices. However, this needs to be balanced with a preference from private sector to be as unregulated as possible.

3 Adapt the carbon credits framework

There is already a legal and regulatory framework for biodiversity credits in Indonesia. Biodiversity credits could be integrated into this existing framework.

4 Safeguarding Indigenous Peoples and local communities

Develop guidance for protection of Indigenous peoples and local communities including the adoption of the principle of FPIC, and inclusion of Article 28A of UUD 1945 and Law No. 39 of 1999 concerning Human Rights as a protection to the Indigenous Peoples and Local Communities' rights into the guidelines for FPIC process for biodiversity projects. The guidance also needs to include benefit sharing mechanisms.

Projects already happening in Indonesia

Case Study 1: Bintan Island

The Natural Capital Initiative pilot project commissioned by AECOM is a 100-hectare area of private land on Bintan Island, where a degraded hillside will be reforested. The project will use AECOM's newly developed Natural Capital Index methodology, which will measure metrics for air, water, soil, carbon and biodiversity. To measure biodiversity, it will monitor a combination of metrics, including fauna community composition (measured using bioacoustic monitoring for amphibians, birds and bats), soil biota communities (using eDNA surveys for soil bacteria and fungi), and habitat value and vegetation structural diversity using the Singapore Biodiversity Accounting Metric (see below), which is also applicable to this part of Indonesia due to its proximity to Singapore. The calculated bio index using these metrics will be compared against reference data from a pristine site to calculate uplift. Buyers into the project will have access to 'contribution claims', analogous to biodiversity credits, via blockchain. The Natural Capital Index methodology may become available for other project developers to use in the future. Note this approach meets the proposed definition for a unit of biodiversity gain (see Section 3) and if independently verified could issue biodiversity credits.

The Singapore Biodiversity Accounting Metric (SBAC)

The SBAC is a habitat assessment tool developed by the Singapore Environmental Council that allows businesses in Singapore to measure their impacts on ecosystems. It was built using extensive datasets from habitats in Singapore, condensing them into a single unit. Habitats are classified into one of three ecosystem types: terrestrial, freshwater and intertidal; any loss in biodiversity must be compensated for by creating or improving a habitat in the same ecosystem type. For a site, the area of each habitat type according to the habitat classification system is recorded. The tool gives each habitat parcel a distinctiveness value, which acts as a proxy for the biodiversity value of that habitat type and a habitat condition score (poor, moderate or good). The baseline habitat units are then calculated using the following calculation, summed to include all habitat parcels:

Habitat parcel size (hectares) x habitat distinctiveness x habitat condition

A risk multiplier is applied to habitats that will be created or enhanced to replace damaged habitats, which reflects the difficulty of creating or enhancing that habitat type.

While this is an extreme simplification of the biodiversity on a site, it can be a useful proxy where more thorough monitoring is not possible, or can be used as the structural metric when using the Wallacea Trust, Plan Vivo or Verra methodologies.

Case Study 2: Borneo Lowland Forests

A local village-level cooperative, KMPGS (Koperasi Mandiri Pematang Gadung Sejahtera), is leading on a project in Kalimantan, Indonesian Borneo, using the Plan Vivo Biodiversity Standard and PV Nature Methodology to quantify the biodiversity certificates to be issued. Interventions will include forest protection (from mining and fires) through patrols, fire-prevention and fire-fighting, and peat restoration through replanting native trees. The biodiversity metrics will include species richness, species diversity, taxonomic dissimilarity, habitat health, and habitat connectivity, and the taxa to be monitored will include low-lying plants, birds and mammals.

3.2 The Philippines

The Philippines does not currently have an existing framework and guidelines on assessing, recognising, implementing and monitoring biodiversity credits in the country.

Carbon credits in the Philippines

The Philippines does not have specific laws or established policies exclusively governing biodiversity credit projects. However, the country is developing a regulatory framework for carbon credits, aiming to establish a structured carbon market. The Philippines Roadmap to Readiness in the Voluntary Forest Carbon Market (2025-2029) provides a strategic framework to enable the country's active participation in the Voluntary Carbon Market. The House Bill No. 11375, approved in 2025, proposes the creation of a domestic emissions trading scheme with provisions for carbon offsets. This could provide a foundation for structured biodiversity credit trading.

As the Philippines' carbon market is still in its formative stages, significant capacity building (particularly for monitoring, reporting and verification) for the Department of Environment and Natural Resources (DENR) and local project developers may be required to handle the technical, financial and operational challenges of integrating the biodiversity and carbon markets.

The Carbon Accounting, Verification, and Certification System (CAVCS) (DAO 2021-43) established under DENR Administrative Order (DAO) 2021-43, is a regulatory framework that provides a standardised system for carbon accounting. It ensures that all carbon-related projects follow scientifically sound and internationally recognised accounting methodologies and encourages and supports investments in activities that sequester carbon dioxide and avoid emissions from deforestation and forest degradation. This could be a model for biodiversity credit verification. It provides a third-party verification system to ensure the credibility of carbon sequestration and emission reduction claims and issues carbon certificates to projects that successfully reduce or capture emissions, allowing them to participate in voluntary or compliance carbon markets.

Compliance legislation

Currently there are no compliance or offsetting regulations in the Philippines. The New Manila International Airport is the first infrastructure project in the Philippines aiming to offset the loss of habitats, developing the 800-hectare Saribuhay sa Dampalit project north of Manila. Although Filipino companies are not presently required to offset damage to biodiversity, as a client of the International Finance Corporation (IFC) the airport developers were required to follow the IFC's rules, including the following the mitigation hierarchy and triggering a requirement for offsets as a last resort if critical and natural habitats are still significantly impacted. This provides an interesting example of how international finance institutions are increasing demand for biodiversity credits, that can be followed by the Philippines.

Biodiversity uplift generated by the wetland creation project will be monitored using the Defra metric, which is used in England to measure Biodiversity Net Gain, a legal requirement for development projects to create a minimum of a 10% increase in biodiversity.

Other relevant policy and legislation

The Philippine Biodiversity Strategy and Action Plan (PBSAP 2024-2040) supports the mainstreaming of biodiversity but does not explicitly mention biodiversity credits.

The Environmental Impact Assessment (EIA) System (P.D. No. 1586) in the Philippines requires project developers to assess and mitigate environmental impacts before starting projects that may harm the environment. Developers must secure an Environmental Compliance Certificate before starting large-scale projects, confirming they have done an EIA and they must propose Environmental Management Plans to reduce negative environmental impacts.

The Wildlife Resources Conservation and Protection Act (R.A. No. 9147) provides a legal framework for conservation work in the Philippines, aiming to prevent the destruction of critical habitats and ensure the survival of endangered and threatened species. The National Integrated Protected Areas System (NIPAS Act, R.A. No. 7586, as amended by R.A. No. 11038) supports the sustainable management and conservation of natural resources within protected areas. It mandates various monitoring requirements to ensure the effective management, protection, and sustainable use of designated protected areas, including measuring the success of conservation actions.

Philippine Ecosystem and Natural Capital Accounting System (PENCAS) Act (R.A. 11995) was established in 2024 to provide a standardised system to measure and monitor the country's natural capital. By providing a consistent framework for valuing ecosystem services and biodiversity, PENCAS enables the quantification of losses due to development and the gains from offset activities. This system could be used to establish standardised metrics for biodiversity offsets. PENCAS helps assign economic value to biodiversity, which may make it easier to price biodiversity credits. However, as it is still in the early stages of implementation, developing biodiversity-specific metrics that account for ecosystem complexity and local contexts will be essential.

The National Blue Carbon Action Partnership (NBCAP) Roadmap is currently being drafted, a plan for high-integrity blue carbon ecosystem conservation initiatives alongside pathways to finance these efforts, which could include recommendations for biodiversity credits projects in the marine environment.

Benefit sharing with local communities

A benefit sharing mechanism on biodiversity credits must be adopted and operationalised to ensure fair and equitable sharing of proceeds or revenues among local communities, government and the project proponents. There should be standards and criteria on what qualifies as biodiversity credits and who qualifies to apply.

Recommendations specific to the Philippines

1

Establishing a National Biodiversity Credit Framework

The Department of Environment and Natural Resources (DENR) should develop a regulatory framework aligning with existing environmental laws and ensuring transparency (independent audit and third-party verification) and community benefit sharing. This will increase trust among investors and buyers of biodiversity credits. Consult with the National Commission for Indigenous Peoples (NCIP) when developing the framework.

2

Link biodiversity credits with carbon markets

Develop joint biodiversity-carbon credit mechanisms and align with carbon market regulations, using the IDXCarbon platform.

3

Integrate biodiversity offsets into the Environmental Impact Assessment (EIA) system

Require businesses with significant ecological impacts to purchase biodiversity credits as part of environmental compliance, implementing localised biodiversity offsetting within the same ecosystem type. Encourage voluntary biodiversity credit purchases for corporate ESG and sustainability goals.

4

Leverage PENCAS for standardised biodiversity credit valuation

Use PENCAS to quantify biodiversity benefits and standardise metrics.

Projects already happening in the Philippines

Case Study 3: Tubbataha Reefs

Conservation International and the Tubbataha Management Office are developing a coral reef project in the Tubbataha Reefs Natural Park in the Philippines. The project managers are designing a maintenance project that uses nature credits to sustain conservation management and secures additional finances to support long-term community livelihood activities and ranger employment from the local communities. The project is one of more than 30 pilot projects approved by the International Advisory Panel on Biodiversity Credits (IAPB). There is still uncertainty over which methodology will be used to quantify the number of credits to be issued but it looks probable that it will be one that meets the five metric requirements for a biodiversity credit described in Section 3.

3.3 Malaysia

State level control over biodiversity

Malaysia's federal structure grants individual states jurisdiction over natural resources, leading to state-specific laws and regulations. This can create challenges in project areas that cross state boundaries. For example, Taman Negara National Park in Peninsula Malaysia crosses state borders and each state wants to implement different laws in the Park.

Even where biodiversity exists on private land, its use requires state government authorisation.

Compliance legislation

Although Malaysia's environmental legislation requires thorough assessments and mitigation measures for developments impacting habitats and species, there is no explicit national mandate for biodiversity offsetting to compensate for environmental losses. Currently project funding comes from the good will of ESG departments, but they are currently more interested in funding carbon than biodiversity projects.

Malaysia does not have a specific national or state level policy that mandates biodiversity offsetting, whereby developers are required to compensate for habitat or species loss by creating or restoring habitats elsewhere.

The foundational Environmental Quality Act 1974 includes provisions for environmental impact assessments (EIAs), which are crucial for projects that may affect biodiversity.

Ensuring benefits for local communities

The National Policy on Biological Diversity 2016–2025 (NPBD) outlines Malaysia's commitment to conserving its biological diversity, promoting sustainable use, and ensuring fair and equitable sharing of benefits arising from the utilisation of biological resources. It emphasises principles such as heritage conservation, the precautionary approach, shared responsibility, participatory management, and good governance.

The Access to Biological Resources and Benefit Sharing Act 2017 (Act 795) regulates access to biological resources and associated traditional knowledge and aims to ensure that benefits derived from their utilisation are shared fairly and equitably. The act mandates obtaining permits for accessing biological resources for research and development, with strict penalties for non-compliance.

Regulation of carbon credits

Carbon credits in Malaysia currently operate solely through voluntary carbon markets, however, the Ministry of Natural Resources, Environment, and Climate Change is in the process of developing regulatory frameworks to support a structured carbon trading system. This creates a key opportunity to add policy that also applies to biodiversity credits. The Bursa Carbon Exchange (BCX) is the voluntary carbon market platform, allowing the trading of credits; a similar platform could be developed for biodiversity credits.

Levies

Some states impose heavy levies on carbon projects, reducing their attractiveness to investors. For example, Sarawak imposes high levies (up to 80%) on carbon credit revenues, leading to concerns over project feasibility.

Recommendations specific to Malaysia

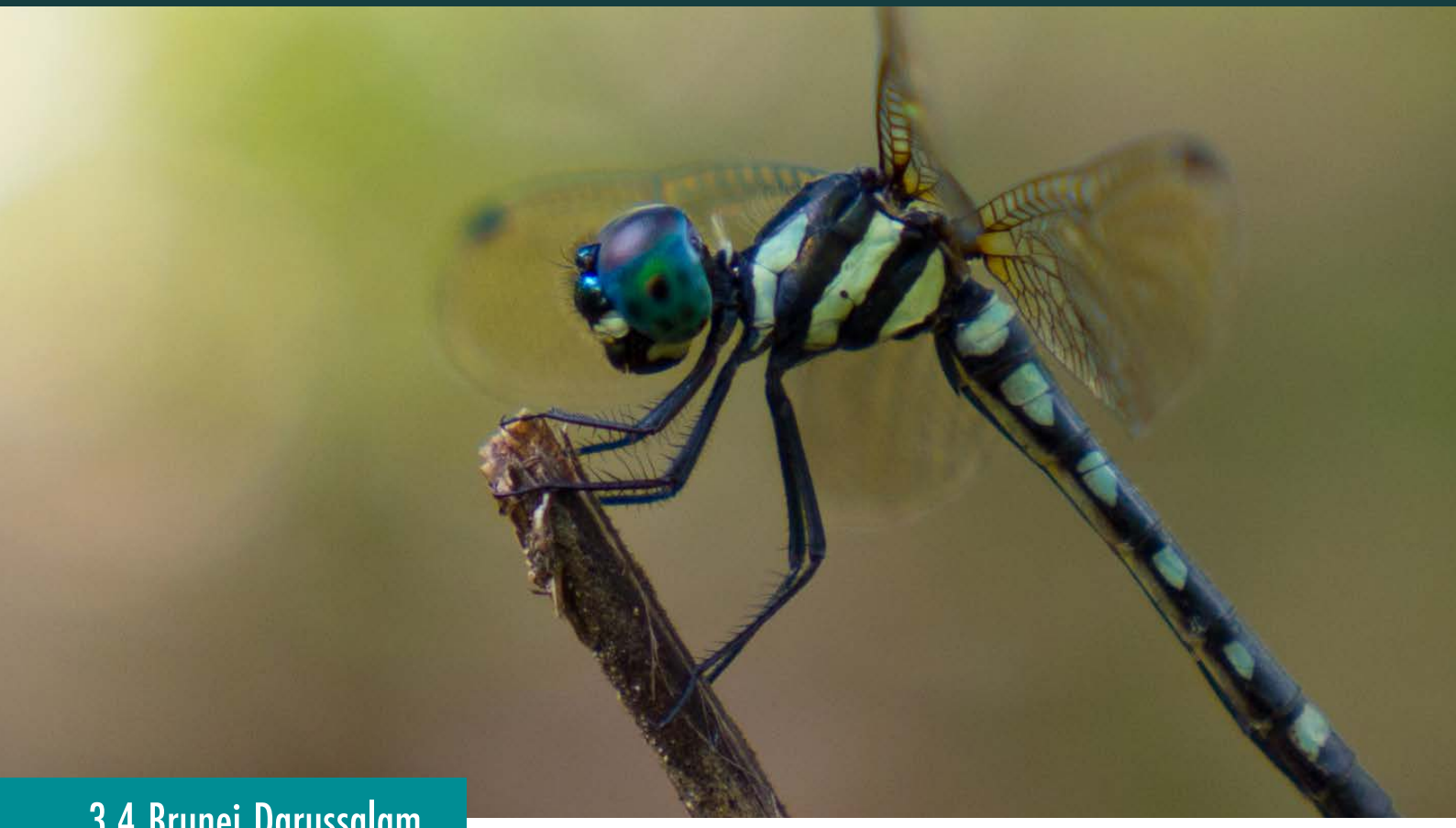
1. Introduce national guidelines to standardise biodiversity credit units of gain while allowing state-level customisation
2. Integration into new policies, e.g. Sabah's Blue Economy Action Plan is currently under development, and could include recommendations for use of biodiversity credits
3. The Environmental Quality Act 1974 could be amended to introduce mandatory biodiversity offsets for developments that impact critical habitats as well as EIAs
4. Develop a Biodiversity Exchange similar to the Bursa Carbon Exchange (BCX) to allow transparent trading of biodiversity credits
5. Review state-level levies on biodiversity credit projects to prevent excessive taxation (e.g., Sarawak's high levies on carbon credits)
6. Implement revenue-sharing models where a portion of levies is reinvested into conservation and local community programs

Projects already happening in Malaysia

Case Study 4: The Malua BioBank

Corporates operating in Malaysia could compensate their biodiversity impacts by purchasing Biodiversity Conservation Certificates from the Malua BioBank which was established in Sabah in 2008. From 2008-2014 it operated as a wildlife habitat conservation bank, whereby one certificate, sold for US$100, represented 100 m^2 of rehabilitation and protection of the 34,000-hectare Malua Forest Reserve. The initial investment was provided by a private fund, the investors in which would receive revenue for the sale of the certificates, aiming to encourage a commercially competitive conservation environment. The revenue was also split with Yayasan Sabah, a foundation established to improve livelihoods of local people, and an endowment for the Malua Trust to fund the future conservation management of the protected reserve.

While not a total success as not all the certificates were sold, the project did manage to sell 2,300, funding the protection of 23,000 ha of forest that is important habitat for orangutans. The slow response from buyers may have been down to the project being ahead of its time before companies across the world started reporting on their nature impacts.



3.4 Brunei Darussalam

The above recommendations can also be applied to Brunei Darussalam. It has a high amount of forest cover (estimated at around 75%), including large areas of primary forest, as well as rich marine ecosystems, but does not currently have any projects producing biodiversity credits nor any specific legislation or policies directly governing them. The Brunei Darussalam National Climate Change Policy includes a strategy on carbon pricing which it intends to introduce in 2025, identifying it as a key instrument for accelerating the low carbon transition by taxing industrial and power facilities emitting beyond a certain carbon emission threshold limit.

In addition, in 2023 the country adopted mandatory carbon emission reporting for companies. Both these policies could be adapted to include nature impact reporting, which would create more demand for biodiversity credits, and taxes for companies that have a high impact on nature. The Environmental Protection and Management Order (2016) mandates environmental impact assessments for new constructions and industrial developments, which also provides an opportunity for building in the mitigation hierarchy and biodiversity offsetting, creating further demand for biodiversity credits.

3.5 Interviews

For this research, rePLANET conducted 15 interviews with government and NGO contacts in Indonesia, Malaysia and the Philippines. There is considerable interest in biodiversity credits from federal and state governments and NGOs, who understand that they are a useful instrument for channelling funding into conservation. In addition to feeding into the legal and policy review (above), the interviews revealed some key concerns centred around two themes:

1. Lack of clarity

- There is an abundant supply of potential projects, for example Indonesia has a lot of social forestry concessions, but the communities who own them don't currently have the capacity or financing for what they want to do. There is a reasonable amount of confusion around what biodiversity credits are and how they work, which is compounded by the lack of a standardised definition for biodiversity units of gain. There is a lack of knowledge about how to leverage them and uncertainty about which standards and methodologies to use.
- As biodiversity credits are a new concept, there is nervousness around the risks involved, which is another reason they aren't being considered by many projects yet.
- It is common for conservation projects in SE Asia to centre around iconic species (e.g. tigers) that are wide ranging, expensive and difficult to monitor for biodiversity unit calculations. At the other end of the spectrum, there are also many small projects that wouldn't be eligible for many of the standards, e.g. for the Verra Nature Framework.

2. Financial Concerns

- There is currently limited access to information about the market, and reassurance is needed about demand and interest from potential buyers.
- Other financial concerns include not having funding for the initial interventions before credits are generated, high costs of monitoring multiple biodiversity metrics being a major barrier to projects being financially viable, and high taxes placed on projects by governments are preventing projects getting off the ground.

The following organisations were represented in the interviews:

AECOM
Department of Environment and Natural Resources, Philippines
Conservation International
Hutan Harapan (Forest of Hope), Indonesia
International Advisory Panel on Biodiversity Credits (IAPB)
Indonesian Chamber of Commerce and Trade (KADIN Indonesia)
KKI Warsi, Indonesia
Marine Research Foundation, Sabah
Ministry of Natural Resources and Environment, Malaysia
Sabah Biodiversity Centre
Sabah Government
Sarawak Forestry
Systemiq Indonesia
UK Centre for Ecology and Hydrology
UNDP Biodiversity Finance Initiative (BIOFIN)

PART 4: RECOMMENDATIONS

Based on the above description of the nascent biodiversity credit market, there are ten key recommendations:

Recommendation 1: Agree a unit of biodiversity gain definition

Given the large number of ways in which biodiversity can be quantified, resulting in outputs presented in non-comparable ways, having a single agreed unit of biodiversity gain recognised across governments would help encourage corporates to quantify the units of biodiversity on their sites and affected by their activities. This is not the same as recommending a single methodology. The carbon world has a single unit of accounting – one tonne of carbon dioxide not emitted or sequestered. Yet there are dozens of carbon methodologies producing credits with outputs in the same units.

It is clear from the analysis in Section 1 that the highest quality definition for a unit of biodiversity gain is:

a 1% gain per hectare in the median value of a basket of at least 5 metrics (taxa) that reflect the conservation objectives for the submitted habitats, with additionality and permanence.

This definition works for Verra, Plan Vivo and Wallacea Trust/ BFI standards and doubtless other methods could be developed to report units of gain to meet this definition.

Recommendation 2: Encourage issuance of biodiversity credits from publicly and philanthropically funded projects

Price discovery for biodiversity credits is necessary in order to attract commercial investment for wildlife conservation or restoration projects. These types of projects are already attracting public money, multilateral development bank soft loans or from private or corporate philanthropy. Encouraging the quantification of the units of biodiversity gain for these projects and issuance of biodiversity credits, would then enable the donors to receive their capital sum back and perhaps recycle the sums into additional projects. More importantly though it would enable price discovery from the sale of the biodiversity credits which is a key component needed for the biodiversity credit market to attract commercial investors.

Recommendation 3: Introduce legislation to require companies to report on their nature impacts

Developing legislation requiring corporates registered within each of the countries to include data on their nature impacts in their annual reports would stimulate demand for biodiversity credits. This is in line with existing EU legislation and this type of legislation will doubtless be developed elsewhere. It would help with developing a business case for corporates on why they should both quantify biodiversity gains as a result of management actions on their own land or that of their suppliers (insetting) and invest in external wildlife conservation or restoration projects in order to generate biodiversity credits.

Recommendation 4: Enforce biodiversity quantification for nature-based carbon projects

Currently, the only liquid nature-related market is for carbon. Indonesia, Malaysia and Philippines all have carbon registries where carbon projects, whether on government, community owned or private land, need approval to proceed. This creates an opportunity for the governments to require all nature-based carbon projects to quantify the units of biodiversity gain they are generating in one standardised unit. This would allow buyers of those credits to claim that they were only buying offsets from projects that were generating an X percentage increase in biodiversity, which would increase the value and appeal of those credits. It would also encourage carbon project developers to design projects that produce a positive biodiversity outcome.

Recommendation 5: Ensure local stakeholder benefits

Using the same carbon registry mechanism to exert control, all approved projects should require a minimum of 60% of the final value of the project (i.e. including profits made on selling the credits to buyers) to go to local communities. A common question is how are government-imposed charges or taxes accounted for in this 60%? In some cases (e.g. government owned land such as mangroves in most SE Asian countries), governments are the owners and managers of these areas, so their charges should be counted towards the local stakeholder commitments. In cases involving privately owned land, governments can still claim to be managers of the site through imposition of national and regional laws applying to private land (e.g. via national carbon accounting bodies such as SRN in Indonesia). However, the main thrust of the carbon or biodiversity credit projects should be to incentivise local stakeholders rather than national level stakeholders, on the basis that the former have a greater influence on whether the project succeeds or not. Government charges (e.g. required donations to NDCs) or taxes (e.g. Indonesia's 10% tax on sale price of credits) therefore reduce the direct benefits going to local stakeholders and governments should bear that in mind when requiring charges and taxes on projects. Project developers will tend to focus investment on countries where a greater percentage of the funds can directly benefit local stakeholders, because these local payments are a good indicator of whether the project will succeed or not.

Recommendation 6: Encourage private sector investments in wildlife conservation

Countries committed to the Kunming-Montreal agreed targets of 30% of land, freshwater and sea protected or restored by 2030 (30x30 targets) will need private sector investment in order to achieve them. Biodiversity credits as a financial instrument are not yet trading and are unlikely to attract commercial investment until there is more evidence of the prices that biodiversity credits will achieve. This means that philanthropic investments into biodiversity projects are likely to be the key funding stream in the next few years. As described in Section 2 of this report, quantifying the units of biodiversity gain from these philanthropic investments and then gifting the philanthropists the ensuing biodiversity credits will enable the philanthropists to recover their initial capital and perhaps recycle the funding into more philanthropic investments. Ensuring that there are no legal or administrative restrictions on allowing these biodiversity credits to be issued and traded will help ensure that these types of philanthropic investments will be concentrated on SE Asian countries. Making it clear in national legislation that owners of land have the rights to sell biodiversity credits would incentivise this activity and encourage investments into nature. Additionally, using the South African approach of giving tax relief for wildlife conservation investments would actively encourage investments into this sector and enable the countries to achieve their 30x30 targets.

Recommendation 7: Introduce compliance legislation

Many countries (e.g. Colombia, UK, USA, New Zealand, Australia) have compliance biodiversity markets where developers of new infrastructure projects need to replace or enhance the biodiversity of the site being affected. Whilst this encourages them to include as much nature as possible in the design of the new projects, they still end up needing to fund the creation of additional habitats as additional offsets. This leads to the development of Environment Banks that develop wildlife conservation projects in order to sell those projects to developers needing offsets for their development projects. Development of biodiversity compliance legislation aimed at new construction projects could provide investment into nature projects as offsets and help the governments achieve their 30 x 30 commitments. However, it is vital that the legislation emphasises the Mitigation Hierarchy (see Section 2.1) and that avoiding and minimising impact on biodiversity of the development is the priority.

Recommendation 8: Develop habitat quantification systems

One area of method development that would not just help with the voluntary markets but could also form the basis for establishing a compliance market for biodiversity would be to develop a habitat-based quantification system. Compliance markets tend to work by measuring the existing habitats and their quality at the planning approval stage and then requiring the developer to replace the habitats either like for like (e.g. the US Clean Water Act 1977 that required replacement of any wetlands damaged during developments) or a net increase in the biodiversity post development (the UK Biodiversity Net Gain concept).

In order to develop a habitat-based system, scientists within the country have to agree and assign a numerical score that identifies the relative value of each of the habitats and the indicators for each habitat that describe whether it is a high, medium or low-quality example. This allows the developer at the planning stage to quantify the area of each habitat in hectares and weight those scores by the quality of each habitat. This overall habitat score then has to be matched or exceeded by the developer replacing habitats elsewhere of similar value to those lost. Currently, in most SE Asia countries there is no numerical way of quantifying the habitat value. However, Singapore has developed a habitat-based calculator for developers which is also being applied in Indonesia (see Case Study 1) and this could be developed for more habitats to provide a system that works across SE Asia. Having such a system would also help the voluntary market because all the multi-metric standards require a structural metric and in the absence of a method for quantifying habitat, they would have to use alternatives such as 3D structure of the environment or plant functional diversity.

Recommendation 9: Governance of biodiversity credits

It is likely that once biodiversity credits start trading properly, their regulation would be most easily managed through the same mechanism used for authorising carbon projects in each country. However, given the nascent state of the biodiversity credit market and the need to encourage inward investment into nature projects (see Recommendation 6), it is recommended that no steps are made at this stage to regulate biodiversity credits. This should be revisited once biodiversity credits are accepted as an international funding mechanism, but should include the following:

- Safeguarding of Indigenous People and local communities
- Ensuring transparency (independent audit and third-party verification)
- Promoting best practice including permanence and additionality requirements
- Preventing any project area destroyed within the last 10 years from being eligible for biodiversity credits

Recommendation 10: Capacity training for issuance of biodiversity credits

The level of knowledge about how biodiversity can be quantified, verified and issued as biodiversity credits was low amongst the government staff interviewed for this report. Capacity training for these staff plus representatives from Indigenous and local people organisations and NGOs should increase the supply of packaged projects. This training should include how specific cases could be packaged in each of the three focal countries.

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