SOCIALCARBON®

Embedding Biodiversity Monitoring into Nature-Based Solutions.

The need to embed biodiversity monitoring to ensure the successful implementation of nature-based solutions.

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About SOCIALCARBON

SOCIALCARBON is an international Greenhouse Gas (GHG) standard focused on Nature-Based Solutions. Utilising leading technology and science, it facilitates the restoration and conservation of natural ecosystems through embedding local communities into projects to ensure lasting sustainable development. www.socialcarbon.org

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Executive Summary.

The loss of biodiversity is considered one of the most pressing environmental issues facing the planet today. It has far-reaching consequences for ecosystems and society in general.

The Convention of Biodiversity proposes the protection of at least 30 percent of the planet by 2030. According to McKinsey & Company, the benefits of achieving this include, but are not limited to:

- Reduction in atmospheric CO2 by 0.9 gigatons to 2.6 gigatons annually through avoided deforestation and natural forest regrowth. This range is equal to 4 to 12 percent of the annual CO2 emissions reductions needed by 2030 to limit global warming to 1.5°C. Progress could, in turn, have a measurable impact on natural-capital stocks.
- Creation of approximately 400,000 to 650,000 jobs in conservation-management fields such as wildlife management and area infrastructure. Natural capital could also support local economic growth through adjacent nature-dependent markets, generating or safeguarding from $300 billion to $500 billion in GDP and 30 million jobs in ecotourism and sustainable fishing alone.
- Expansion of the protected habitat of species threatened with extinction by 2.2 to 2.8 times.

To achieve these targets, conservation finance must grow by between $20 billion to $45 billion a year. Novel approaches are required to access the funding needed to reach these targets.

Both carbon credits and biodiversity credits promote environmentally sustainable practices and provide financial incentives for conservation and restoration efforts. Whilst companies and governments offset their greenhouse gas emissions by purchasing credits from projects that reduce or sequester carbon, biodiversity credits incentivise the conservation and restoration of natural habitats and species by assigning monetary value to them, which can then be sold or traded on the market.

This paper explores global biodiversity trends and challenges, whilst also examining potential solutions.

1. The global Biodiversity crisis

The decline in global biodiversity.

One in four species are at risk of extinction; since 1970, species populations have declined on average 68%[1]. This poses not only a threat to the natural world but humanity. We cannot survive without nature; it is integral to our existence.

Biodiversity loss refers to the ongoing loss of the variety of life on Earth in terms of the number of species and their distribution across ecosystems[2].

The Global Assessment Report on Biodiversity and Ecosystem Services[3] shows that biodiversity is declining alarmingly, with species extinction rates estimated to be up to 1,000 times higher than natural rates. This decline is caused by human activities such as habitat destruction, pollution, climate change, and the introduction of invasive species.

Decreased biodiversity can have significant ecological, economic, and social consequences. Ecologically, it can lead to the collapse of ecosystems, loss of ecosystem services, and the extinction of species. Economically, it can affect industries such as agriculture, forestry, and fisheries, which depend on biodiversity. Socially, it can lead to the loss of cultural and recreational values associated with nature.

Results of a study show that despite a few encouraging achievements, efforts to address the loss of biodiversity need to be substantially strengthened by reversing destructive policies, fully integrating biodiversity into broad-scale land-use planning, incorporating its economic value adequately into decision-making, and sufficiently targeting funding and implementing policies that tackle biodiversity loss, among other measures[4].

Efforts to address the decline in global biodiversity include conservation measures such as protected areas, habitat restoration, and regulating activities that harm biodiversity. Public education and awareness campaigns can also help reduce human impacts on biodiversity by encouraging more sustainable practices and reducing demand for products that contribute to habitat destruction and other harmful activities. The table below shows data for the average biodiversity decline around the world.

Rank	Region	Average decline (between 1970 and 2016)
1	Latin America & Caribbean	94%
2	Africa	65%
3	Asia Pacific	45%
4	North America	33%
5	Europe and Central Asia	24%

Drivers of biodiversity loss.

The issue of global biodiversity loss is complex and multifaceted, with multiple drivers that must be addressed through a comprehensive and integrated approach. A holistic approach is crucial to tackling the issue of biodiversity loss and requires concerted efforts that address the root causes of the problem.

To effectively halt biodiversity loss, it is crucial to identify and prioritise the anthropogenic drivers that are the most significant direct causes[1]. This knowledge is essential for developing and implementing effective policies to address the issue.

There are many drivers of biodiversity loss. The direct drivers are activities that directly cause habitat destruction, fragmentation, degradation, and species extinction, such as converting natural habitats into agricultural land, urban areas, mining, and industrial activities. This results in the loss of natural habitats and the fragmentation of ecosystems, leading to the isolation of species and the decline in their populations.

Increasing temperatures, changing rainfall patterns, and extreme weather events caused by climate change are leading to the loss of habitats, changes in migration patterns, and the decline in populations of many species.

The discharge of pollutants, such as pesticides, fertilisers, and chemicals, into the environment is leading to the contamination of ecosystems and the decline in the populations of many species. Studies[6] argue that there is a logical link between chemical pollutants and biodiversity: adverse effects caused by toxic anthropogenic chemicals on the organisms in the environment could lead to the extinction of sensitive species, thus reducing biodiversity. Based on this understanding, two recent European Union policy initiatives, the “EU Biodiversity Strategy for 2030” and the “Zero pollution action plan” have explicitly recognised pollution as one of the five main drivers of biodiversity loss[7].

Overall, the drivers of biodiversity loss are complex and interconnected, and addressing them requires a holistic and integrated approach. To effectively address the issue of global biodiversity loss, it is necessary to implement policies and actions that target all the major drivers and their interactions rather than just focusing on certain factors in isolation.

Implications on ecosystems and climate change.

The relationship between biodiversity and ecosystem functions is interconnected, and biodiversity loss can result in reduced provision of ecosystem services such as carbon storage and climate regulation.

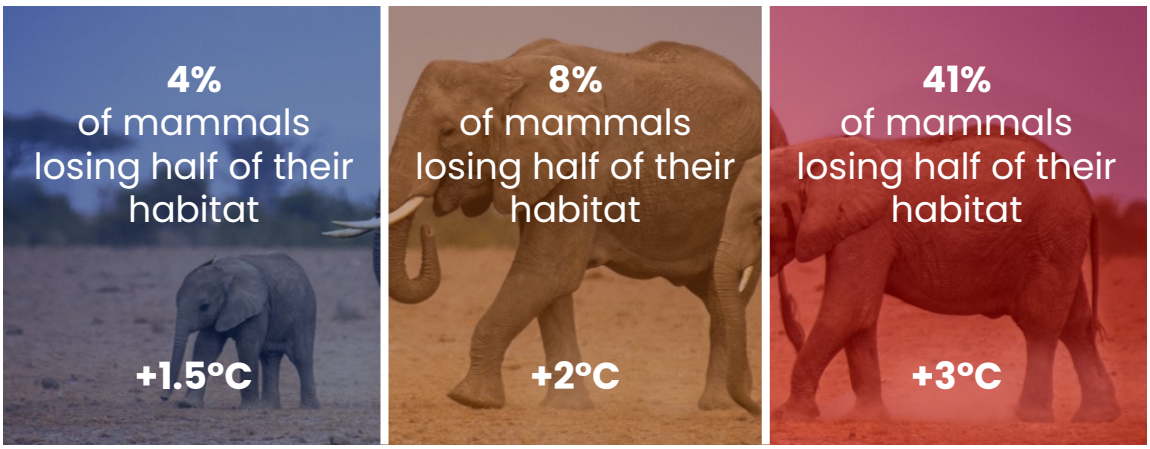
Biodiversity loss has significant implications for both ecosystems and climate change. According to the Global Assessment Report on Biodiversity and Ecosystem Services published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the loss of biodiversity and ecosystem services not only poses risks to human well-being but also has significant implications for climate change and other planetary boundaries.

Ecosystems rely on a diverse range of species to function correctly. Each species in an ecosystem has a unique role to play, and the loss of one species can have a domino effect on the entire ecosystem. In addition, it can lead to an increase in invasive species, which can outcompete native species and further disrupt the balance of the ecosystem.

Climate change can also be affected by biodiversity loss. Many species play a crucial role in regulating the Earth´s climate; for instance, when forests are destroyed or degraded, the carbon originally sequestered by these biomes is returned to the atmosphere.

It is also important to mention that biodiversity loss can lead to the loss of genetic diversity within species, which can make them less resilient to environmental change, such as those caused by climate change.

To summarise, biodiversity loss has significant implications for ecosystems and climate change. Protecting and restoring biodiversity is essential for the health and sustainability of the planet.



2. How do we address biodiversity loss

Measuring and monitoring biodiversity.

Neglecting biodiversity monitoring leads to the omission of a crucial indicator of the well-being of an ecosystem. It must be monitored.

Common models

1. **Species inventories:** to document and catalogue the various species present within a specific area, such as a particular ecosystem, region, or habitat. Its purpose is to create a comprehensive and accurate list of organisms inhabiting the site, including plants, animals, fungi, and microorganisms. A species inventory typically involves field surveys, data collection, and species identification.
2. **Population surveys** assess the abundance, density, and distribution of specific target species within a given area. These surveys provide valuable information about population dynamics, species trends, and changes in biodiversity over time.
3. **Habitat assessment**: evaluates the quality, suitability, and condition of habitats that support various species within a given area. It focuses on assessing the ecological characteristics, physical attributes, and environmental factors that influence the presence and abundance of different organisms. Moreover, it provides valuable insights into the health and functionality of habitats, aiding in understanding biodiversity patterns and informing conservation efforts.
4. **Ecological indicators**: provide quantitative or qualitative measurements that reflect ecosystems' condition, health, and functioning. By tracking ecological indicators, scientists and conservationists can gain insights into the status of biodiversity, detect changes over time, and inform management strategies.
5. **Remote sensing**: provides valuable information about the distribution and composition of various species and ecosystems. A remote sensing model combines satellite imagery, aerial photography, and other remote sensing data to analyse and quantify biodiversity at different spatial and temporal scales. It is important to note that while it provides valuable insights into biodiversity, it is often used with ground-based surveys and field data to validate and calibrate the results. Integrating remote sensing with other data sources allows a more comprehensive understanding of biodiversity patterns and processes.
6. **Citizen science**: is an approach that involves engaging the general public, or "citizen scientists", in scientific research and data collection. It has emerged as a powerful tool for measuring and monitoring biodiversity due to its ability to gather large amounts of data over vast geographical areas.

By using these methods and others, researchers and conservationists can better understand biodiversity and how it is changing over time. This knowledge can inform conservation and management efforts to protect biodiversity and maintain healthy ecosystems. Overlooking the importance of biodiversity may give the impression of a thriving forest superficially, while its health might be deteriorating silently.

Biodiversity plays a vital role in maintaining the health of ecosystems, and neglecting its monitoring, preservation, and cultivation can endanger the survival of these ecosystems, undoing all the benefits gained through nature-based projects. A 2019 study[7] found that large herbivores, such as elephants, can affect ecosystems and biogeochemical cycles; elephant disturbances increase aboveground biomass by 26–60 tonnes per hectare. The same study estimated that the extinction of forest elephants would result in a 7% decrease in the aboveground biomass in central African rainforests.

Incentivising land-use change.

Land-use change is a primary driver of deforestation and biodiversity loss; landowners need the incentive to protect their native biodiversity and habitats.

Land-use change, such as converting natural ecosystems to agriculture or urban development, can significantly impact biodiversity, ecosystem services, and the climate. It is essential to incentivise sustainable land-use practices to reduce environmental negative impacts.

There are several approaches to incentivise land-use change:

1. **Payment for ecosystem services (PES)**: compensate landowners for the ecological services provided by their land, such as carbon sequestration, water regulation, and biodiversity conservation. PES programs can incentivise landowners to adopt more sustainable land-use practices.
2. **Land-use zoning and planning**: setting aside areas for conservation and prioritising sustainable land uses, such as agroforestry, which combines agriculture with tree planting to support biodiversity and reduce carbon emissions.
3. **Certification schemes**: certifying sustainable land-use practices, such as organic farming and sustainable forestry, which can help to promote and provide market incentives for environmentally friendly products.
4. **Tax incentives**: governments can offer tax incentives for landowners who adopt sustainable land-use practices, such as protecting or restoring ecosystems, planting trees, or reducing carbon emissions.
5. **Environmental markets**: creating markets for ecosystem services, such as carbon credits, can provide financial incentives for sustainable land-use practices that reduce carbon emissions.

Whilst several mechanisms exist, challenges arise with their implementation. Political factors often influence government-based incentives in the form of tax or certification schemes and are slow to be implemented. In addition, economic growth is often prioritised over sustainable development, particularly in developing countries.

International market-based incentives, such as the global carbon market, offer a faster option but are heavily influenced by the underlying asset's price. The volatility of the asset's price, e.g., carbon credits, creates a level of uncertainty not seen with other incentive mechanisms, e.g., tax incentives.

3. Potential market mechanisms

Carbon markets.

Conservation financed through carbon credit revenue is increasingly being explored.

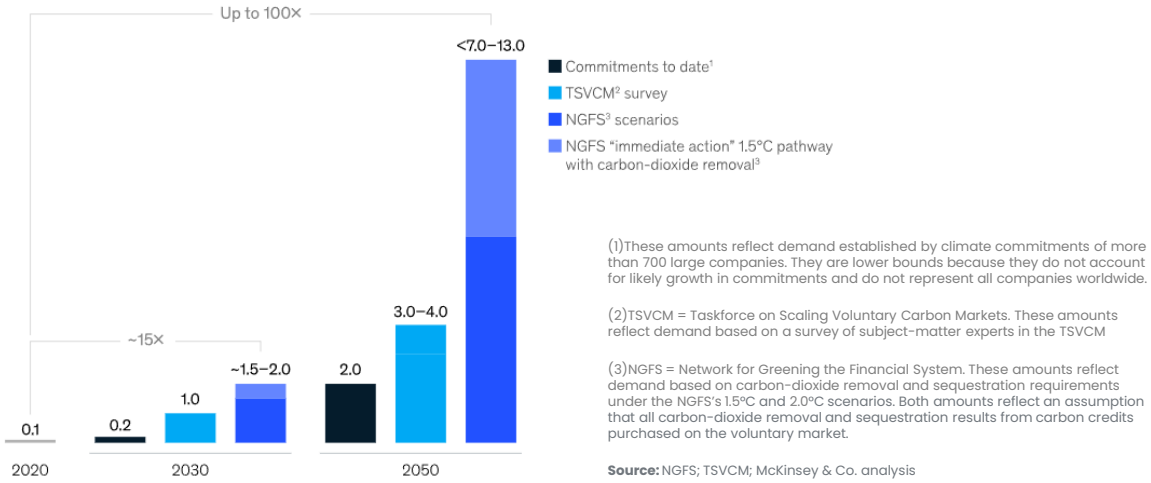
The carbon markets have an essential role to play in conservation. They offer a multi-faceted approach to finance, enabling buyers of the credit to claim the action as part of their sustainability strategy whilst offering project developers greater access to financing; the demand for carbon credits increases the scope of potential funders beyond what was previously possible with a grant-based approach.

A variety of carbon project types exist, including:

1. **REDD+**: is a climate change mitigation strategy that aims to reduce greenhouse gas emissions by incentivising the protection and restoration of forests.
2. **ARR (Afforestation, Reforestation and Revegetation)**: aims to restore degraded or deforested areas by planting new trees, restoring natural vegetation, or enhancing degraded landscapes.
3. **Regenerative agriculture**: involves farming practices prioritising soil health, biodiversity, and ecosystem services, such as carbon sequestration and water conservation, while providing sustainable food production.

The voluntary carbon market is expected to grow from $2 billion in 2020 to around $250 billion by 2050[14]. Looking beyond the voluntary carbon market, national and regional carbon markets have emerged, including those in China, California, Quebec, New Zealand, and South Korea, and various schemes and voluntary markets in different countries.

Voluntary demand scenarios for carbon credits, gigatons per year



(1)These amounts reflect demand established by climate commitments of more than 700 large companies. They are lower bounds because they do not account for likely growth in commitments and do not represent all companies worldwide.

(2)TSVCM = Taskforce on Scaling Voluntary Carbon Markets. These amounts reflect demand based on a survey of subject-matter experts in the TSVCM

(3)NGFS = Network for Greening the Financial System. These amounts reflect demand based on carbon-dioxide removal and sequestration requirements under the NGFS's 1.5°C and 2.0°C scenarios. Both amounts reflect an assumption that all carbon-dioxide removal and sequestration results from carbon credits purchased on the voluntary market.

Source: NGFS; TSVCM; McKinsey & Co. analysis

Biocredits.

Biocredits are a financial instrument that “rewards” the conservation and restoration of natural habitats and species diversity.

The 2023 consultation paper “The Future of the Biodiversity Credit Markets” states that the movement to establish and expand biodiversity credit markets is gaining significant traction. Enthusiasm for these markets is rapidly increasing, although there has been limited trading and investment in biodiversity outcomes thus far.

Some stakeholders are genuinely motivated by a strong desire and commitment to environmental stewardship, recognising the importance of protecting biodiversity. For others, engaging in biodiversity credit markets is a mandatory requirement imposed by regulations or compliance frameworks. Additionally, there are those who understand that neglecting biodiversity conservation can have detrimental impacts on their value chains, balance sheets, and overall commercial value.

An international response is needed to address global challenges, such as those outlined in the Global Biodiversity Framework by the Convention on Biological Diversity (CBD) and its finance-related targets. Biodiversity credits are expressly included in these targets, notably in Target 19, to catalyse further private sector engagement from small start-ups and large conglomerates. The integration and expansion of biodiversity credit markets are key drivers to incentivise and mobilise private sector action in biodiversity conservation. These markets aim to facilitate more significant investment, participation, and innovation in biodiversity conservation efforts by aligning financial incentives with environmental goals.

Based on this, Biocredits can be a valuable tool for promoting biodiversity conservation, provided they are used in a responsible and transparent manner, and the conservation projects generating the credits are designed to support the preservation of biodiversity over the long term.

The specific equivalence or value for one Biocredit can vary depending on the context, the methodology used, and the regulatory framework in place. It is typically determined based on the ecological value or biodiversity benefits generated by the conservation or restoration actions associated with it. The quantification and valuation of Biocredits involve several factors, such as, biodiversity metrics, conservation goals and standards, market demand and supply, and cost of conservation actions. It is important to note that Biocredits are often context-specific and subject to local regulations and guidelines.

Ultimately, the equivalence of one biodiversity credit represents the ecological value generated by a conservation action or habitat enhancement, as evaluated based on the specific criteria and standards defined within the offset program or regulatory framework.

SOCIALCARBON'S approach to the biodiversity.

We believe projects should be holistically designed and developed, monitoring carbon and biodiversity in parallel.

Monitoring co-benefits by default

To deliver long-term sustainable results, nature-based projects must be holistically designed and monitor several variables beyond just carbon. SOCIALCARBON requires all projects to monitor at least five other sustainable livelihood resources beyond carbon: Biodiversity, Social, Financial, Natural and Human.

To be eligible for certification, all projects must monitor at least 3 indicators per resource and demonstrate continuous improvement under each hand. This mandatory monitoring differs from other voluntary carbon standards, which allow tasks to monitor these impacts voluntarily. Through monitoring these indicators and aligning to our requirement for continuous improvement, projects must be designed to benefit biodiversity and the local stakeholders long-term.

Biodiversity-focused methodologies & requirements

We are embedding biodiversity considerations into methodologies and project types in general. All Afforestation / Reforestation projects must plant at least 60% native species. Meanwhile, methods such as SCM0006 can only be used by projects located in areas of biodiversity importance. In some cases, such as SCM0007, biodiversity impacts directly influence a project's eligibility to issue credits (in addition to the co-benefits); all projects under SCM0007 must demonstrate a 20% increase in phytoplankton biodiversity following the treatment of the harmful algae blooms.

References.

1. Loh, J., Green, R. E., Ricketts, T., Lamoreux, J., Jenkins, M., Kapos, V., & Randers, J. (2005). The Living Planet Index: using species population time series to track trends in biodiversity. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *360*(1454), 289-295 https://royalsocietypublishing.org/doi/abs/10.1098/rstb.2004.1584 .

2. Jenkins, M., Scherr, S. J., & Inbar, M. (2004). Markets for biodiversity services: potential roles and challenges. *Environment: Science and Policy for Sustainable Development*, *46*(6), 32-42 https://www.tandfonline.com/doi/abs/10.1080/00139157.2004.10545160?journalCode=venv20

3. Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., ... & Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*, *486*(7401), 59-67.

4. Díaz, S. M., Settele, J., Brondízio, E., Ngo, H., Guèze, M., Agard, J., ... & Zayas, C. (2019). The global assessment report on biodiversity and ecosystem services: Summary for policy makers https://www.ipbes.net/global-assessment

5. Butchart, S. H., Walpole, M., Collen, B., Van Strien, A., Scharlemann, J. P., Almond, R. E., ... & Watson, R. (2010). Global biodiversity: indicators of recent declines. *Science*, *328*(5982), 1164-1168 https://www.science.org/doi/abs/10.1126/science.1187512.

6. Jaureguiberry, P., Titeux, N., Wiemers, M., Bowler, D. E., Coscieme, L., Golden, A. S., ... & Purvis, A. (2022). The direct drivers of recent global anthropogenic biodiversity loss. *Science advances*, *8*(45), eabm9982 https://www.science.org/doi/full/10.1126/sciadv.abm9982.

7. Berzaghi, F., Longo, M., Ciais, P., Blake, S., Bretagnolle, F., Vieira, S., ... & Doughty, C. E. (2019). Carbon stocks in central African forests enhanced by elephant disturbance. Nature Geoscience, 12(9), 725-729.

8. Groh, K., Vom Berg, C., Schirmer, K., & Tlili, A. (2022). Anthropogenic chemicals as underestimated drivers of biodiversity loss: scientific and societal implications. *Environmental Science & Technology*, *56*(2), 707-710.

9. Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., ... & Waterfield, T. (2018). Global warming of 1.5 C. *An IPCC Special Report on the impacts of global warming of*, *1*(5), 43-50.

10. Porras, I., & Steele, P. (2020). Biocredits.

11. States and Trends of carbon pricing: https://openknowledge.worldbank.org/entities/publication/58f2a409-9bb7-4ee6-899d-be47835c838f

12. B. Gonçalves et al (2015). Biodiversity offsets: from current challenges to harmonized metrics: https://www.sciencedirect.com/science/article/pii/S1877343515000378

13. The future of Biodiversity Credit Markets: https://www.naturefinance.net/wp-content/uploads/2023/02/TheFutureOfBiodiversityCreditMarkets.pdf

14. Morgan Stanley. https://www.morganstanley.com/ideas/carbon-offset-market-growth#:~:text=The%20voluntary%20carbon%2Doffset%20market,help%20meet%20net%2Dzero%20targets.