Blue Carbon

A KNOWLEDGE PRIMER

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CENTRE FOR A SMART FUTURE

SNAPSHOT

• Blue Carbon ecosystems cover less than 2% of ocean area, yet store over 50% of the total carbon sequestered in ocean sediments, offering high rates of carbon sequestration and valuable co-benefits like habitat protection. Blue carbon ecosystems include mangroves, salt marshes and seagrass.

• However, these ecosystems are at risk of becoming significant carbon emission sources if not properly conserved.

• The Intergovernmental Panel on Climate Change (IPCC) estimates about 151 countries have at least one blue carbon ecosystem (BCE), with 71 countries possessing all three types. Sri Lanka is one of them.

• Blue Carbon ecosystems are crucial for meeting ambitious climate targets, but exploitation and climate change threaten their permanence and effectiveness.

• Blue Carbon schemes are beneficial tools for reducing greenhouse gas emission and also have the potential to provide distinct benefits for local communities and ecosystems where they operate.

• Carbon Market-based approaches, such as Compliance Markets and Voluntary Markets, alongside Article 6 guidelines as stipulated under the Paris Agreement, hold significant potential to mobilize Blue Carbon resources to meet global mitigation goals and the individual NDCs of a country.

• While there is significant potential for Blue Carbon to be considered as a powerful tool in mitigating the climate crisis and raising much-needed conservation and climate finance, global frameworks, guidelines and initiatives need to align to ensure that resources, communities and stakeholders are incorporated into planning processes. Sri Lanka must be acutely aware of the risks and also know how to structure meaningful and impactful projects.

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1. Introduction and Context

Oceans are considered to be the largest heat sink on the planet, absorbing 90% of the excess heat caused by climate change and 23% of human induced CO2 emissions.[1] Yet the concept of blue carbon remains relatively obscure to many. Blue Carbon refers to the organic carbon stored within vegetated coastal and marine ecosystems, including mangroves, seagrass and salt marshes.

Despite occupying less than 2% of the ocean area, these ecosystems store over 50% of the total carbon sequestered in ocean sediments.[2] Blue Carbon ecosystems are reported to have significantly higher rates of carbon sequestration in their sediments per area of habitat, accounting for up to ten times that of a terrestrial ecosystem.[3]

Beyond carbon storage, these ecosystems also offer valuable co-benefits such as habitat protection, storm buffering, and pollution filtration. As carbon sinks and ecosystem service providers, they are also powerful Nature-based solutions (NbS) for enhancing both mitigation and adaptation efforts. However, the loss of blue carbon ecosystems due to land-use changes have had the opposite effect.[4]

Globally, these ecosystems are disappearing or degrading on account of continuing developmental pressures, climate change and land use changes.[5] If these ecosystems are degraded or destroyed, their capacity as carbon sinks and co-benefit providers diminishes, leading to the release of carbon stored within their sediments. These ecosystems could thereby become significant sources of carbon emissions if they are not properly conserved and protected.

This primer explores the critical importance of blue carbon in combating climate change, and importantly, examines how blue carbon projects can be leveraged to finance coastal ecosystem conservation, and serve as a powerful tool for safeguarding these vital resources.

1 World Bank. "What You Need to Know About Blue Carbon," November 25, 2023. https://www.worldbank.org/en/news/feature/2023/11/21/what-you-need-to-know-about-blue-carbon#:~:text=Oceans%20are%20the%20largest%20heat,of%20Blue%20Carbon%20coastal%20ecosystems.

2 United Nations Environment Programme. Blue Carbon: The Role of Healthy Oceans in Binding Carbon. 2009. https://wedocs.unep.org/20.500.11822/7772

3 McLeod, E., G. L. Chmura, S. Bouillon, R. Salm, M. Björk, C. M. Duarte, C. E. Lovelock, and B. R. Silliman. "A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO2

4 The Blue Carbon Initiative. "What is Blue Carbon? — The Blue Carbon Initiative," n.d. https://www.thebluecarboninitiative.org/about-blue-carbon#:~:text=When%20coastal%20ecosystems%20are%20degraded,billion%20tons%20of%20CO2released%20annually.

5 Pendleton, Linwood, Daniel C. Donato, Brian C. Murray, Stephen Crooks, W. Aaron Jenkins, Samantha Sifleet, Christopher Craft, et al. "Estimating Global 'Blue Carbon' Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems." PloS One 7, no. 9 (September 4, 2012): 2. https://doi.org/10.1371/journal.pone.0043542.

2. Why are Blue Carbon Ecosystems so important?

From mangroves and marshes to seagrass, a variety of blue carbon ecosystems play a role in carbon sequestration and coastal protection. Mangroves are a type of tropical forest found in the coastal zone and flooded regularly by tidal water.[6] As one of the more well-known coastal ecosystems, they contribute 14% of carbon sequestration to the global ocean sequestration capacity.[7] It is estimated that mangroves capture and store up to 34 million metric tons of carbon annually.[8] It is also estimated that global mangrove ecosystem restoration efforts have the potential to sequester 841 million tons of CO2 annually.[9]

The role of mangroves also moves beyond climate mitigation capabilities, and provides essential ecosystem services. Thriving in the coastal-marine interface where other plants typically struggle, mangroves are adapted to salinity and temperature changes and have extensive root systems that allow them to withstand tidal flows.[10] With this natural infrastructure, mangroves provide low-lying coastal regions with significant storm-buffering capabilities and facilitate coastal resilience. A tidal marsh is a wetland, and unlike mangroves, is predominantly covered by grasses and herbaceous plants (plants without woody stems). Sequestering over 200g of CO2 per square metre per year, their potential global carbon stocks are estimated to be over 1 billion metric tons.[11]

Similar to mangroves, seagrass beds also provide ecosystem services including biodiversity protection, sediment trapping, and storm surge reduction.[12] Seagrass are submerged flowering plants that account for 0.2% of the world's ocean beds. They sequester approximately 10% of the carbon buried in ocean sediment annually, amounting to 27.4 million metric tons of carbon.[13] Seagrass ecosystems are also breeding grounds and habitats for various species, which depend on the large amounts of oxygen they produce and nutrients they absorb.

While conservation and restoration of blue carbon ecosystems can help reduce greenhouse gas emissions however, their overall contribution is limited. It's important to note that blue carbon sequestration can only address a small portion (around 3%) of the total emissions caused by human activities.[14]

6 The Blue Carbon Initiative. "What Is Blue Carbon? — The Blue Carbon Initiative," n.d. https://www.thebluecarboninitiative.org/about-blue-carbon#:~:text=Mangroves%20are%20a%20type%20of,rich%20forests%20in%20the%20tropics%20*.

7 Alongi, Daniel M. "Carbon Sequestration in Mangrove Forests." Carbon Management 3, no. 3 (June 2012): 313–22. https://doi.org/10.4155/cmt.12.20.

8 EurekAlert! "Coastal Wetlands Excel at Storing Carbon," February 1, 2017. https://www.eurekalert.org/news-releases/502718.

9 Centre for a Smart Future. "Blue Carbon: Potentials and Pitfalls." Youtube, May 11, 2024.

10 Murray, Lisa, and Ben Mulligan. The Blue Carbon Handbook: Blue Carbon as a Nature-Based Solution for Climate Action and Sustainable Development. London: High Level Panel for a Sustainable Ocean Economy, 2023. https://bluecarbonpartnership.org/wp-content/uploads/2023/10/23_REP_HLP_Blue-Carbon-Handbook.pdf.

11 Worthington, Thomas & Spalding, Mark & Landis, Emily & Maxwell, Tania & Navarro, Alejandro & Smart, Lindsey & Murray, Nicholas. (2023). The distribution of global tidal marshes from earth observation data. 10.1101/2023.05.26.542433.

12 The Blue Carbon Initiative. (n 11)

13 Ibid

14 Lovelock et. al. (n1) 196

3. Role of Blue Carbon Ecosystems in Sri Lanka

The Intergovernmental Panel on Climate Change (IPCC) estimates about 151 countries have at least one blue carbon ecosystem (BCE), with 71 countries possessing all three types. Sri Lanka is one of them. Sri Lanka was also the first country in the world to legally protect its remaining mangrove forests in 2015 and is one of the handful of countries that recognizes blue carbon ecosystems as both mitigation and adaptation strategies. Some of these countries include the Bahamas, Belize, Chile, Fiji, Liberia, and the Maldives.

Sri Lanka's coastal zones support a diverse range of blue carbon ecosystems, including mangroves, seagrasses, and salt marshes. In Sri Lanka, low tidal amplitude has led to mangroves being contained within a narrow tidal belt with patchy distribution. As of 2020, the area of mangrove habitat in Sri Lanka was 198.74 km^2, representing a linear coverage of 24.98% of the 3,328.20 km of the coastline.[15]

Seagrass meadows and salt marshes, while exhibiting lower biomass compared to mangroves, also play a crucial role in carbon sequestration due to their high rates of soil carbon storage[16] Tidal marsh coverage in the island extends up to 238 km2, sequestering around 2 million metric tons of carbon.[17] Further, research has shown that seagrass beds in Puttalam, located in north-western Sri Lanka, can store a substantial amount of carbon, with each hectare having the capacity to store up to 236.76 metric tons.[18] These seagrass meadows not only sequester carbon but also provide vital habitat for numerous fish species.

15 "Globalmangrovewatch.org" https://www.globalmangrovewatch.org/

16 Bijeesh, Kozhikkodan Veettil, Vikram Puri, Deepthi Wickramasinghe, Raymond David Ward, Milica Stankovic, Susantha Udagedara, and Yasasvi Madawala. 2024. "Blue Carbon Ecosystems in Sri Lanka: A Review." Estuarine, Coastal and Shelf Science 306: 108907. https://doi.org/10.1016/j.ecss.2024.108907.

17 Perera, N., E. Lokupitiya, D. Halwatura, and S. Udagedara. "Quantification of Blue Carbon in Tropical Salt Marshes and Their Role in Climate Change Mitigation." Science of the Total Environment 820 (May 10, 2022): 153313.

18 Gobisankar, S., & Ranasinghe, D. (2022). Assessment of the blue carbon stocks including mangroves, seagrasses and salt marshes in Puttalam, north west Sri Lanka. Journal of Environmental Professionals Sri Lanka, 11(1), (2022) https://doi.org/10.4038/jepsl.v11i1.7884

However, since the late 1970s, Sri Lanka has lost an estimated 75% of its mangrove forests, half of its tidal marshes, and over 96% of its seagrass over a 7 year period[19] Additionally, salt marshes in regions like Karainagar are facing alarming rates of destruction, despite their significant ecological importance.[20]

The resulting socio-economic challenges have included diminishing fish stocks, and vulnerable coastlines. Given the country's heavy reliance on marine and coastal resources which are present in 14 of its 25 districts, Sri Lanka stands to gain considerable benefits from blue carbon initiatives and the establishment of a baseline for safeguarding these vital ecosystems.[21]

However, comprehensive carbon storage assessments for Sri Lanka's coastal ecosystems, particularly seagrass meadows and salt marshes, remain limited due to data availability constraints.[22] In addition to this, economic analysis of blue carbon ecosystems, and country-level quantification of carbon stocks in these ecosystems are yet to be conducted.[23]

19 Pahalawattaarachchi, Vasantha. 2022. "Past, Present and Future of Sri Lankan Coastal Macrophyte-Dominated Ecosystems: Blue Carbon, Conservation, Restoration and Policy". CRC Press eBooks.

20 Ahalya, A and K. Suresh. "Salt Marsh Ecology in Karainagar, Sri Lanka." Scientific Research Journal (2020): n. pag.

21 Digest, Ceylon, and Ceylon Digest. "Coastal Zone Management in Sri Lanka." Ceylon Digest, September 24, 2022 https://www.ceylondigest.com/coastal-zone-management-in-sri-lanka/

22 Veettil, Bijeesh Kozhikkodan, Vikram Puri, Deepthi Wickramasinghe, Raymond David Ward, Milica Stankovic, Susantha Udagedara, and Yasasvi Madawala. 2024. "Blue Carbon Ecosystems in Sri Lanka: A Review." Estuarine, Coastal and Shelf Science 306: 108907. https://doi.org/10.1016/j.ecss.2024.108907.

23 Ibid

4. Carbon Markets and Blue Carbon Offsets

Carbon markets incentivize climate action by enabling parties to trade carbon credits generated by the reduction or removal of GHGs from the atmosphere. As such, they are trading schemes that create financial incentives for activities that reduce or remove greenhouse gas emissions.

In these schemes, emissions are quantified into carbon credits that can be bought and sold. One carbon credit is equal to one ton of carbon dioxide, or an equivalent amount of a different greenhouse gas, that has been reduced, sequestered, or avoided.[24] Carbon credits can be purchased by a variety of entities, including countries, corporations, and individuals, to help them meet their climate goals. More than 140 countries across the globe are currently mobilizing to fulfil their Nationally Determined Contributions (NDCs), aiming to reduce emissions by 45% by 2030 and achieve net zero emissions by 2050, as outlined by the Paris Agreement.

Given these ambitious targets, Blue Carbon ecosystems have garnered international attention for their significant sequestration and storage capacities, emerging as potential tools in climate change mitigation and adaptation. However, reports reveal that over the past five decades, at least one-third of the world's mangroves have disappeared.[25] Unless recognized as valuable resources to be sustainably managed, they will continue to be exploited at current rates.

The framework providing guidelines for international carbon markets is Article 6 of the Paris Agreement.[26] Carbon Market-based approaches, such as Compliance Markets and Voluntary Markets, alongside Article 6 guidelines as stipulated under the Paris Agreement, hold significant potential to mobilize Blue Carbon resources to meet global mitigation goals and the individual NDCs of a country. There are an estimated 30 compliance carbon markets around the world and an untold number of voluntary ones. The compliance markets are far larger, accounting for $850 billion in value in 2021, compared with $1 billion to $2 billion for the voluntary markets. [27]

24 Reichle, David E. 2020. "Chapter 12 - Carbon, Climate Change, and Public Policy." In The Global Carbon Cycle and Climate Change, edited by David E. Reichle, 253–287. Elsevier.https://www.sciencedirect.com/science/article/abs/pii/B9780128202449000123

25 Alongi, Daniel M. "Present State and Future of the World's Mangrove Forests." Environmental Conservation 29, no. 3 (2002): 331–49. https://doi.org/10.1017/S0376892902000231.

26 "The Paris Agreement"

27 ICE. "Global carbon pricing mechanisms and their interaction with carbon markets," Page 10

The Carbon Markets

The Compliance Market

Established by governments or multi-government bodies, compliance markets are based on a 'cap and trade' system.' Under this system, Governments allocate a number of permits to regulated companies which can be exchanged between market players. Each permit reflects one metric ton of Carbon Dioxide (or other greenhouse gas) emissions. If companies emit less than their quota of permits, they are free to trade with those who have exceeded their emissions limit.

Compliance Markets are overseen and regulated by mandatory international, regional, and subnational reduction schemes, some of which include the California Carbon Market, the Clean Development Mechanism regulated by the Kyoto Protocol, and the European Union's Emissions Trading Scheme (EU ETS). In South Asia, India is the only country that has launched a domestic carbon compliance market

Voluntary Carbon Market (VCM)

Voluntary markets are fundamentally different to government regulated 'compliance markets.' These markets rely on the trade of carbon credits created by investments in environmental projects. Unlike a cap-and-trade system, the voluntary carbon market employs a project-based approach where there is no predetermined limit on allowances. Within this market, additional carbon credits can be generated through the implementation of environmental projects.

Companies have the option to purchase these credits to offset their unavoidable emissions and achieve their emission reduction targets. Typically implemented in developing countries, these credit development projects are geared towards mitigating future emissions. Although there is a diverse range of projects available, they all share a common requirement: they must be deemed "additional" to be eligible for the VCM. This standard dictates that the project's actions, such as carbon removal or reduction, would not have taken place without the offset project.

Carbon Credits vs. Carbon Offsets

While Article 6 has expanded the carbon market to facilitate more efficient allocation of resources, it does not encompass the entire ecosystem of carbon trading. The terms "carbon offsets" and "carbon credits" are often used interchangeably within carbon markets.

While these terms essentially refer to the same concept—financial instruments to reduce greenhouse gas (GHG) emissions—the tendency to collectively refer to both offsets and credits as "credits" can cause ambiguity.

The primary distinction lies in the fact that credits and offsets serve two different purposes. Credits represent greenhouse gas emissions released into the atmosphere, while offsets represent greenhouse gases removed from the atmosphere. Purchasing a single carbon credit permits you to release one metric ton of greenhouse gases into the atmosphere, but purchasing an offset results in the removal of one metric ton of greenhouse gas emissions.

Hence, carbon credits are a way to limit emissions, while carbon offsets are a way to compensate for emissions.

Since their inception, Carbon markets have expanded to include Blue Carbon offsets, which reduce emissions by preserving coastal and marine ecosystems. However, due to their exceptional capacity to capture and retain carbon as carbon sinks, blue carbon ecosystems have surpassed their terrestrial counterparts of equivalent size. The conservation and restoration efforts in these areas have yielded a higher number of offsets compared to their terrestrial counterparts. The mechanism behind Blue Carbon mirrors conventional carbon offsetting.

How Does Carbon Credit Valuation Work?

While blue carbon markets are relatively new when compared to the regular Carbon Markets, they're expected to play a significant role as demand for carbon credits exceeds supply, increasing fifteen-fold from 2020 levels with an estimated value of up to $50bn by 2030.[33]

As of 2022, the difference between Blue Carbon Credits and high-quality terrestrial REDD+ credits is $13.[34] REDD+ credits are primarily used to fund activities that preserve forests and avoid forest-related greenhouse gas emissions.

However, while Blue Carbon Credits are being traded at a significant premium when compared to other credits, they live within a relatively new market with many countries unsure of how to govern them.[35]

Project methodologies are still in the midst of development, and accurate carbon testing remains a costly endeavour in many parts of the globe.[36]

Additionally, any carbon projects require significant start-up capital and do not see profits from credit sale until years later.[37] With these costs, additional to the nature of unregulated markets, the price and value of blue carbon credits are often varied from each other. While carbon credits follow basic standards, their quality and thereby price depends on the cost of development, and the extent of impact.[38] Expanding on the carbon credit ecosystem, the same principle would apply to blue carbon credits.

33 Blaufelder, Christopher, Cindy Levy, Peter Mannion, and Dickon Pinner. "A Blueprint for Scaling Voluntary Carbon Markets to Meet the Climate Challenge." McKinsey & Company, January 29, 2021. https://www.mckinsey.com/capabilities/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge#/.

34 Abatable. 2023. "What Are Blue Carbon Projects?" Abatable. n.d. https://www.abatable.com/blog/blue-carbon.

35 H, Simon. "The Importance of Blue Carbon Credits." Carbon Credits, March 22, 2023

36 Man Institute | Man Group. "Effective Carbon Price: The Missing Link for Carbon as An Alpha," n.d. https://www.man.com/maninstitute/effective-carbon-price.

37 Opisteam. "High Costs, Geopolitical Risks Impede Blue Carbon Removal Projects." OPIS, A Dow Jones Company, April 15, 2024. https://www.opisnet.com/blog/high-costs-geopolitical-risks-blue-carbon/.

38 "Cracking the Code of Carbon Pricing: How Does It Work?," October 25, 2023. https://www.green.earth/blog/cracking-the-code-of-carbon-pricing-how-does-it-work.

Within the VCM, better verification leads to demonstrable results. As awareness of environmental damage increases, results will lead to greater sale of carbon offsets. Companies that are able to demonstrate that their offsets contribute to sustainable development will experience greater demand, and those that achieve clear greenhouse gas (GHG) emissions reductions will attract more investors into the fore.[39]

One important verification standard is the Gold Standard for Global Goals.[40] The Gold Standard is one of the leading standards and registries in the voluntary carbon market. It ensures that projects aiming to issue Gold Standard carbon credits are achieving positive outcomes. Gold Standard-certified projects use a cost-based model and a value-driven model to certify the price of credits. A cost-based model takes into account the implementation costs of a project and is used to help ensure the on-going viability of projects.[41] These models calculate a minimum price which ensures that the average costs of projects will be covered alongside a 'Fairtrade Premium' that is directed to community funds to help them become more resilient to climate change.[42] Cost-based models ensure project sustainability, but it does not account for the additional value these projects deliver.

In contrast, the value-driven model sets a price for carbon credits which fully accounts for the environmental, social, and economic impacts of specific projects- this includes benefits of sequestration and additional co-benefits (any external positive impact to emissions reduction) of conservation.[43] However, while these prices set standards of how credits should be quantified, they are at the mercy of market forces, resulting in a disparity between average market prices and the demonstrated value of impact.

However, while we could use carbon markets to value and determine the prices of blue carbon credits, it is important to note that these ecosystems are vastly different in their sequestration capacities alongside ecosystem restoration rates, and require different methodologies and approaches. For instance, studies have emerged to show that upon restoration carbon sequestration rates are high in blue carbon ecosystems. However, rates plateau as ecosystems begin to mature.[44] While sequestered carbon continues to be stored, when counting sequestered units rates must be verified in accordance with the timeline of each restored ecosystem.[45]

39 Ibid

40 Gold Standard for the Global Goals. "Gold Standard for the Global Goals – Standard Documents," n.d. https://globalgoals.goldstandard.org/.

41 UNDP. 2022. Report on International Voluntary and Compulsory Carbon Markets with Special Emphasis to Mechanisms Applied in Case of Carbon Farming and Potential Opportunities for Ukrainian Developers. May 16."Report on International Voluntary and Compulsory Carbon Markets with Special Emphasis to Mechanisms Applied in Case of Carbon Farming and Potential Opportunities for Ukrainian Developers." UNDP , May 16, 2022. https://www.undp.org/sites/g/files/zskgke326/files/2022-11/FINAL%20REPORT%20UNDP%20LH%20CARBON%20FARMING.pdf

42 A portion of funds reinvested back into communities to ensure the sustainability of community efforts.

43 Ibid

44 Carnell, Paul E., Maria M. Palacios, Paweł Waryszak, Stacey M. Trevathan-Tackett, Pere Masqué, and Peter I. Macreadie. "Blue Carbon Drawdown by Restored Mangrove Forests Improves with Age." Journal of Environmental Management 306 (March 2022): 114301. https://doi.org/10.1016/j.jenvman.2021.114301.

45 Ibid

5. Benefits of Blue Carbon Schemes

Blue carbon offset projects have assisted in reducing greenhouse gas emissions alongside offering distinct ecosystem advantages that differentiate them from other offset projects. A large part of these advantages trickle down to local communities while supporting a diverse range of plant and animal species. By preserving and conserving mangroves and marshes, these projects effectively sequester carbon that can be stored for long periods of time, combat shoreline erosion, enhance water quality and provide co-benefits to the implementing ecosystem and region.[46]

Co-benefits refer to any positive impact, other than direct GHG emissions reduction, that can be generated by carbon offset projects.[47] These range from regional socio-economic, environmental, and economic benefits.[48] By incorporating meaningful and measurable co-benefits into projects, developers can ensure that initiatives align with global sustainability goals and provide real value beyond emissions neutrality.[49]These benefits directly impact local communities.

Carbon offset projects located in developing countries often introduce new technology into the region, and require project developers to acquire resources needed to facilitate technology transfers and train local workforce in how to operate new technology.[50] This operational training can help the workforce build new technical skills that might be helpful beyond the life of a specific project, introducing short-term and long-term means of employment.[51]

The Mikoko project in the Gazi-Kwale County of Kenya, for example, has seen nearly 500 members of the community participate in the regular protection and planting of new mangroves.[52] With 32% of payments going to community projects, this intervention has created numerous jobs and assisted in wealth creation for local communities.[53]

Carbon projects have also created more inclusive economies for those on the margins of the national economy. For instance, the Australian Government actively encourages farmers to take part in carbon farming (agricultural methods that enhance the uptake and storage of CO2).[54]

46 Hilmi, N., Chami, R., Sutherland, M., Hall-Spencer, J. M., Lebleu, L., Benitez, M. B., & Levin, L. A. (2021). The role of blue carbon in climate change mitigation and carbon stock conservation. Frontiers in Climate, 3. https://doi.org/10.3389/fclim.2021.710546

47 "Co-Benefits of Carbon Offset Projects: Information for Carbon Offset Procurement." Second Nature. Second Nature, September 2020. https://secondnature.org/wp-content/uploads/Co-Benefits-Document-Rev5.pdf.

48 Ibid

49 Ibid

50 Kountouris, Yiannis , Zen Makuch, and E Feng Tan Loh. "Quantification and Evaluation of the Voluntary Market's Co-Benefits," 2014.

51 Ibid (n 90)

52 Commonwealth. "Case Study: Community-Led Mangrove Restoration and Conservation in Gazi Bay, Kenya - Lessons From Early Blue Carbon Projects (on-Going)," n.d. https://thecommonwealth.org/case-study/case-study-community-led-mangrove-restoration-and-conservation-gazi-bay-kenya-lessons.

53 Ibid

54 Macintosh, Andrew. "The Carbon Farming Initiative: Removing the Obstacles to Its Success." Carbon Management 4, no. 2 (April 2013): 185–202. https://doi.org/10.4155/cmt.13.9.

In exchange for increasing carbon sequestration or reducing GHG emissions on land, farmers, including those in indigenous communities receive Australian Carbon Credit Units (ACCUs), which are then ethically traded to deliver socio-economic benefits to communities.[55]

Co-benefits also include biodiversity benefits besides carbon sequestration, such as ecosystem services that affect not only coastal communities, but tourism, water filtration, storm surge and flooding protection for coastal infrastructure.[56] By maintaining these ecosystems, blue carbon offset purchases have the incentive to fund projects that bolster their supply chain. The seafood industry, for instance, contributes to the preservation and restoration of harvested species, protecting nursery habitats from extreme weather and erosion, and in turn enhances human livelihoods.[57]

Additionally, co-benefits can also be reflected in the price of carbon credits. Due to the nature of the VCM the price of an offset is effectively determined by market supply and demand, but offset prices may also reflect other preferential factors such as the type of projects, the type of verification and the type of co-benefits. For each metric ton of CO2 emissions removed, carbon offsets can deliver up to an estimated worth of $600 of co-benefits.[58] Buyers have been increasingly drawn to, and willing to pay more for, dual-certified projects which verify both emissions reductions and co-benefits. These benefits must be able to quantify and verify additionality and permanence, similar to offsetting.[59] Third party verification bodies such as the Gold-Standard for Global Goals, the Verified Carbon Standard with Climate Community, and Biodiversity Standards, have introduced processes to verify co-benefits associated with offset projects.[60]

While these benefits could be considered universally impactful for any country looking to support a blue economy, it is vital for developing nations attempting to infiltrate these markets. The flexibility of offsets allows entities to decide on how to best invest or offset their emissions through various projects or projects sizes. Stakeholders can customise their offsetting strategies to match their unique objectives, inclinations, and operational contexts. They can also customise the scale of their offset projects based on factors such as the magnitude of their emissions, available resources, and the level of environmental impact they aim to achieve. This ensures that both large corporations and small businesses can participate in offsetting activities, fostering inclusivity in the pursuit of environmental responsibility. For countries such as Sri Lanka that have pressing environmental and economic needs, alongside stakeholder concerns, participating in markets that reflect true costs and external benefits may lead to a snowball effect, meeting environmental and economic goals beyond the blue economy.

55 Ibid

56 Ecological Benefits Framework. "Mikoko Pamoja - Ecological Benefits Framework," November 10, 2023. https://ebfcommons.org/case-study/mikoko-pamoja/.

57 "Blue Carbon Projects | Reef Resilience," n.d. https://reefresilience.org/management-strategies/blue-carbon/blue-carbon-projects/.

58 Ibid (n 90)

59 "CoreCarbon Watch - Business' Road to Carbon Offsets. How Crucial Are Co-Benefits?," June 29, 2022. https://www.linkedin.com/pulse/corecarbon-watch-business-road-carbon-offsets-/.

60 Ibid

Box 3 : Community-led Implementation Mikoko Pamoja, Kenya

The Mikoko Pamoja project exemplifies a successful community-driven approach in Blue Carbon project management. In 2010 ,Gazi Bay residents in Kenya saw a loss of approximately 20% of their mangrove forests to timber harvesting. As a result, residents partnered with the UK Charity Plan Vivo and the Association for Coastal Ecosystem Services (ACES) based in Scotland to launch a mangrove conservation and restoration project. The project protected 117 hectares of land in Gazi Bay from illegal deforestation. Between 2014 and 2018, it generated 9,8880 credits, disbursing $58,591 in payments to the community to date.[61]

A key factor contributing to the success of the project was the extensive community participation, ownership and support from Gazi and Makongei residents. Plans for land use and revenues were collectively devised and implemented with transparency, ensuring that participants were aware of the limits placed on the land alongside expected benefits.

Sources: Commonwealth. "Case study: Community-led Mangrove Restoration and Conservation in Gazi Bay, Kenya - Lessons From Early Blue Carbon Projects (on-going)," n.d, Ecological Benefits Framework. "Mikoko Pamoja - Ecological Benefits Framework," November 10, 2023.

61 Macintosh, Andrew. "The Carbon Farming Initiative: Removing the Obstacles to Its Success." Carbon Management 4, no. 2 (April 2013): 185–202. https://doi.org/10.4155/cmt.13.9.

6. Debates and Criticisms

It is evident that blue carbon projects offer significant opportunities. However, carbon markets are often riddled with risk, and projects usually come with a range of challenges and complexities that must be addressed.

Regulatory Issues

While acknowledging blue carbon in NDCs is a step in the right direction, there are still certain limitations related to including them in NDCs.

Although, by virtue of (Article 4, Paragraph 2) of the Paris Agreement parties are legally required to submit NDCs and "pursue domestic mitigation measures with the aim of achieving the objectives of such contributions" , the actual fulfillment of the NDC is not legally binding or enforceable. Therefore there is no practical legal obligation for states to commit to these contributions.

Potential Liabilities in Carbon Sequestration

Overall while the promise of blue carbon offsets is alluring, some arguments suggest that it may inadvertently lead to a rise in net emissions over extended periods of time.

Existing blue carbon stocks are stored in sediment and can no longer actively sequester CO2 from the atmosphere.[62] These insecure storage sites hold emissions that could potentially be released into the atmosphere in the future, posing as liabilities as opposed to assets. Further, the ongoing rate of the re-release of carbon due to climate change, destruction, or rising sea levels is uncertain.[63] While the accumulation of carbon is gradual and incremental, in most cases, carbon release tends to be episodic and highly variable. [64]

Extended over a period of time, this re-release could surpass ongoing burial rates, leading to higher overall net emissions.

We still lack a comprehensive understanding of the drastic changes that climate change may bring soon and the extent of its impact on existing carbon stocks. Therefore, there is a possibility that viewing blue carbon as an infallible solution to rising emissions could be misguided and ultimately counterproductive.

62 Johannessen, Sophia C., and James R. Christian. "Why Blue Carbon Cannot Truly Offset Fossil Fuel Emissions." Communications earth & environment, November 8, 2023. https://doi.org/10.1038/s43247-023-01068-x.

63 Climate Analytics. "The Dangers of Blue Carbon Offsets: From Hot Air to Hot Water?," December 9, 2023. https://climateanalytics.org/publications/the-dangers-of-blue-carbon-offsets-from-hot-air-to-hot-water.

64 Ibid

Greenwashing and the Illusion of Sustainability

Protecting blue carbon ecosystems also protects their capacity to absorb and bury carbon dioxide. One could argue that offsets for protecting the opportunity for future burial are different from offsets protecting existing stock, but even offsets for future burial cannot completely balance out existing emissions.[65]

Offsetting fails to address the root problem, and in doing so offers an avenue for entities to keep emitting with a "carbon neutral" promise. Blue Carbon thereby becomes an instrument in greenwashing, allowing companies to make environmentally conscious claims without actually adopting sustainable practices or reducing greenhouse gas emissions.[66] This is further compounded by the fact the carbon market is unregulated. Carbon schemes which lack verification and transparency often fail to address the additionality aspect of blue carbon and have a high potential for greenwashing.

Transparency, Accountability and the Role of Incentives

Since most carbon credits to date are traded on the voluntary market as opposed to a centralised system such as a government-regulated market, transparency and accountability can be difficult to determine. Firstly, there is no standardised methodology for quantifying and verifying blue carbon offsets.

Verra, the world's largest voluntary carbon market program, controls the Verified Carbon Standard (VCS) and certifies carbon credits once they offset emissions.[67] It established a Blue Carbon Working group to implement a unifying framework. However, analysis of a significant proportion of Verra projects indicate that more than 90% of its rainforest offset credits are likely to be "phantom credits" and do not represent genuine carbon reductions.[68] While many argue that Verra's methodology should come under further scrutiny and adaptation so that it can be reapplied effectively, others claim that it is the incentive structure that is at fault. This incentive structure encompasses four of the key players within a carbon market; land owners or stewards, project developers, verifiers, and consumers.[69]

Many projects incentivise local communities and farmers by compensating them for their lack of land use (mangrove cutting, shrimp farming, etc.) and thereby hope to protect ecosystems in the process. However, despite this payment there is destruction that inevitably occurs, to which most verifiers turn a blind eye on account of their incentive to do so. Verra collected 10 cents for every credit it certified.[70]

65 Ibid

66 "Sustainability: Examples of Greenwashing and Misleading Marketing | Business Room," n.d. https://en.blog.exed.novasbe.pt/articles/sustainability-examples-of-greenwashing-and-deceptive-marketing.

67 Greenfield, Patrick. "Revealed: More than 90% of Rainforest Carbon Offsets by Biggest Certifier Are Worthless, Analysis Shows." the Guardian, January 30, 2023.

68 Ibid

69 LSE International Development. "The Verra Scandal Explained: Why 'Avoided Deforestation' Credits Are Hazardous," January 26, 2023. https://blogs.lse.ac.uk/internationaldevelopment/2023/01/26/the-verra-scandal-explained-why-avoided-deforestation-credits-are-hazardous/.

70 Ibid

With no incentive to sound the alarm, many of those offsets proved to be inflated or redundant. While these verification standards are constantly revised and susceptible to adaptation, their incentive structures feed into the fragmented nature of the market and its inability to integrate accountability and uniformity into its overall structure. Additionally, an absence of certainty with government involvement means that funds may not trickle down to the communities it intends to finance. In pursuing nationalisation, Madagascar prevented NGOs from striking deals with private players. By a draft decree, the Malagasy government claimed exclusive rights to sign agreements with carbon credit buyers and distribute funds.[71] The uncertainty around this piece of local legislature led to further complications for local communities tied to the Tahiry Honko project.

The Tahiry Honko project, developed through the Blue Forests Initiative and undertaken by Blue Ventures, centred local communities creating carbon financing projects to conserve mangroves.[72] The NGO agreed to sell the credits to an undisclosed buyer at $27,000 every year for next three years. However, the government's refusal to recognise the agreement with the carbon credit buyer meant uncertainty over fund supply and allocation.[73] The lack of standardised methodologies and fund distribution structures in the voluntary carbon market, coupled with uncertainties in government involvement, reveal significant challenges in ensuring effective and transparent carbon offset projects. These issues highlight the need for more robust regulatory frameworks and clearer accountability mechanisms needed to ensure that projects and credits deliver genuine environmental and community-centric benefits.

The Complex Nature of Carbon Measurement in Coastal Ecosystems

Carbon markets facilitate the trade of credits that are priced, verified, and once exchanged, permanently retired. This fairly self-assured system relies on coastal ecosystems which are subject to significantly higher levels of risk and uncertainty. Uncertainties in measuring carbon flows in blue carbon ecosystems are much higher than uncertainties in other ecosystems. Mangrove ecosystems are non-linear and not in equilibrium as they adapt to constantly evolving shorelines.[74] While they do sequester substantially more carbon than terrestrial forests, these figures may vary. A survey of the Australian seagrass habitats which took note of inter-habitat variability revealed an 18-fold difference in the carbon stored.[75] Studies have also shown similar patterns in Sri Lanka where analyses across the structural characteristics of mangroves at the Malwathu Oya estuary indicated changes along the gradient from estuarine shorelines to land.[76]

71 Martens, Els. "The Mangroves of Kenya: General Information. Compiled for Netherlands Wetlands Conservation and Training Programme, 1996." Kenya Wildlife Service, 1996. https://aquadocs.org/bitstream/handle/1834/8378/ktfe217156_86.pdf?sequence=1&isAllowed=y.

72 Euronews. "'Carbon Colonialism': Locals Forced out as Dubai Carbon Credit Company Makes Land Grab in Africa," April 8, 2024. https://www.euronews.com/green/2024/04/08/carbon-colonialism-locals-forced-out-as-dubai-carbon-credit-company-makes-land-grab-in-afr.

73 Malavikavyawahare. "Even as the Government Bets Big on Carbon, REDD+ Flounders in Madagascar." Mongabay Environmental News, August 18, 2021. https://news.mongabay.com/2021/08/even-as-the-government-bets-big-on-carbon-redd-flounders-in-madagascar/.

74 Ibid (n 107)

75 Lavery, Paul S., Miguel-Ángel Mateo, Oscar Serrano, and Mohammad Rozaimi. "Variability in the Carbon Storage of Seagrass Habitats and Its Implications for Global Estimates of Blue Carbon Ecosystem Service." Edited by John F. Valentine. PLoS ONE 8, no. 9 (September 5, 2013): e73748. https://doi.org/10.1371/journal.pone.0073748.

76 Perera, K. A. R. S., and M. D. Amarasinghe. "Assessment of Blue Carbon Stock of Mangroves at Malwathu Oya Estuary, Sri Lanka." OUSL Journal 16, no. 1 (June 30, 2021): 75. https://doi.org/10.4038/ouslj.v16i1.7519.

Along this gradient, the amount of carbon stored in plant biomass decreases, while carbon stocks in the soil increases.[77] Variations therefore, aren't limited to coastal shorelines or inter-habitat species but also include soil and plant biomass stocks. It is important to take note of these variables when attempting to quantify and project possible sequestration capacities for current and future burial rates

Blue Carbon Projects and Implications for Land Rights

Proponents of Blue Carbon often claim that schemes safeguard ecosystems by diverting much needed conservation finance to local communities. However, the reality is that Blue Carbon projects have frequently led the newest wave of Large-Scale Land Acquisitions (LSLA) for carbon credits.[78] Typically, the ownership of acquired land falls into the hands of project developers, predominantly foreign entities, rather than local or indigenous communities.[79] These developers profit from adding conserved ecosystems to the baseline, yet verifying the principles of additionality is often challenging or redundant due to the pre-existing efforts of indigenous communities. In contrast, indigenous communities receive little to no compensation for their contributions, while suffering displacement from their lands on account of these projects. Blue Carbon induced "land grabs" have been particularly evident in Africa, where countries have conceded land areas the size of the UK to Blue Carbon initiatives.

Liberia, for instance, has conceded 10% of its territory to a private Emirate company known as Blue Carbon, granting the company overarching control of one million hectares of Liberian forests.[80] Should the Memorandum of Understanding (MoU) be executed, it would be in breach of multiple Liberian laws, most importantly the 2019 land Rights Law, safeguarding communities' rights to "customary land".[81] Dubbed as 'Carbon Cowboys,' these entities have made a practice out of exploiting nature-based carbon markets.[82] Despite pledges that these initiatives would channel billions of dollars of biodiversity and climate finance to developing nations, vast stretches of land have been snatched up while money and infrastructure have not trickled down.[83]

77 Ibid

78 Writer, Guest. "Additionality In Carbon Offsets: Carbon Cowboy's Role In Africa." Climate Action Africa, September 18, 2023. https://climateaction.africa/carbon-offsets-carbon-cowboys-role-in-africa/.

79 Ibid

80 Hoffner, Erik. "Control of Africa's Forests Must Not Be Sold to Carbon Offset Companies (Commentary)." Mongabay Environmental News, November 22, 2023.

81 Erickson-Davis, Morgan. "Liberia's New Land Rights Law Hailed as Victory, but Critics Say It's Not Enough." Mongabay Environmental News, April 3, 2019. https://news.mongabay.com/2019/03/liberias-new-land-rights-law-hailed-as-victory-but-critics-say-its-not-enough/.

82 Greenfield, Patrick, and Nyasha Chingono. "'We Don't Know Where the Money Is Going': The 'Carbon Cowboys' Making Millions from Credit Schemes." the Guardian, March 15, 2024. https://www.theguardian.com/environment/2024/mar/15/money-carbon-credits-zimbabwe-conservation-aoe.
Financial Times. "The Looming Land
Grab in Africa for Carbon Credits," n.d. https://www.ft.com/content/f9bead69-7401-44fe-8db9-1c4063ae958c.

83 Financial Times. "The Looming Land Grab in Africa for Carbon Credits," n.d. https://www.ft.com/content/f9bead69-7401-44fe-8db9-1c4063ae958c.

The reality is there exists no legal or contractual obligation for credit-selling companies to distribute revenues to local communities, often concealed by developers - a harsh reality for communities surrounding Lake Kariba in Hurungwe district of Zimbabwe, where numerous villages endure an average poverty rate of 88%. Experts assert that Kariba is illustrative of broader issues within the market, where forest conservation projects primarily enrich international traders at the expense of local communities, enabling them to capitalise on nature-based markets in developing nations, thereby perpetuating a form of carbon colonialism in profiting from ecosystems.[84]

84 Ibid

7. Key considerations for Sri Lanka

At COP27, Sri Lanka introduced its Climate Prosperity Plan (CPP), which aims to achieve net zero carbon status by 2050.[85] As a comprehensive national strategy, the CPP focuses on reducing greenhouse gas emissions, enhancing climate resilience, and attracting foreign investment prioritizing climate concerns.[86] A key element of the plan involves innovative debt arrangements to protect national creditors, redirecting financing toward sustainable and resilient investments.

A central aspect of this includes establishing a carbon finance hub to evaluate soil, forest, and blue carbon, thereby facilitating greater access to carbon financing. The CPP targets utilizing carbon finance for projects offsetting 200,000 metric tons of CO2 by 2030 and 100,000 metric tons of CO2 by 2025.[87]

Sri Lanka has also formally discussed purchasing carbon credits under the UN system with South Korea, Singapore and Japan.[88] Given the global context of Blue Carbon initiatives and the complexities surrounding carbon markets, Sri Lanka faces a unique set of opportunities and challenges. To effectively leverage Blue Carbon for climate action and sustainable development, the country must carefully consider several key factors.

Navigating Regulatory Complexities

However, the practical application of these efforts could prove to be more complex, especially in light of recent moves to de-gazette certain marine protected areas that are known to be rich blue carbon ecosystems. One such instance was evident in the de-gazetting of the Viduththalthivu Nature Reserve in Mannar, where the protected area status of certain undisclosed areas within the reserve were called to be revoked, potentially making way for proposed aquaculture development initiatives.[89] Previous aquaculture initiatives in other parts of the country have left ecosystems depleted, polluted, and void of nutrients needed to sustain coastal ecosystems.[90] Therefore, while Sri Lanka's Climate Prosperity Plan represents a forward-thinking approach to addressing climate change and fostering sustainable development, the effectiveness of these strategies will depend on careful management of environmental resources, particularly in sensitive marine ecosystems. Balancing economic and ecological priorities will be crucial in ensuring the long-term success and integrity of the country's climate initiatives.

85 "Sri Lanka Climate Prosperity Plan."

86 Ibid

87 Ibid

88 Financial Times. "The Looming Land Grab in Africa for Carbon Credits," n.d. https://www.ft.com/content/f9bead69-7401-44fe-8db9-1c4063ae958c.

89 Groundviews. "Reconsidering the De-gazetting of Vidattaltivu Nature Reserve," May 31, 2024. https://groundviews.org/2024/05/31/reconsidering-the-de-gazetting-of-vidattaltivu-nature-reserve/.

90 Jayasinghe, J.M.P.K. "Shrimp Culture in Sri Lanka: Key Issues in Sustainability and Research," n.d.

Additionally, by being classified under the forestry sector, like most natural forests in Sri Lanka, the Forestry Department and the Department of Wildlife Conservation owns, manages and protects mangroves.[91] Other government departments such as the Department of Coast Conservation and Coastal Resource Management, the Marine Environment Protection Authority, the Central Environmental Authority, and the Department of Fisheries and Aquaculture with overlapping mandates have also been involved with mangroves, with specific provisions for management within each department.[92]

When considering Blue Carbon Projects such as mangrove protection or restoration, third party verifiers often work with government bodies and community organisations. Since Sri Lanka's land-sea interface is managed by numerous stakeholders, this could cause confusion regarding regulatory responsibility and formal rules of collaboration. Classification and authorities over specific areas should be clearly indicated to ensure more effective project implementation.

Stakeholder Mapping and Consultations : Enhancing Community Engagement
Successful Blue Carbon projects hinge on robust stakeholder mapping and meaningful consultations with local communities to ensure equitable participation and benefit-sharing. Most mangrove forests in Sri Lanka are situated in the sea-land interface, on both public and private lands.[93] Sri Lanka's current restoration projects such as the Mangrove Caretaker Programme (MCP), and projects in the Anawilundawa Wetland Sanctuary, have made a practice out of converting previously abandoned shrimp farms into mangrove restoration sites.[94] However, when considering blue carbon restoration projects, navigating issues around land tenure can be a costly endeavour in both time and barriers to implementation.

One key element is that of stakeholders. Projects need to identify most, if not all, existing stakeholders and lead adequate consultation processes before engaging in long-term restoration efforts. Socio-economic factors have also played a significant role in Sri Lanka's conservation sites. The Anawilundawa Wetland Sanctuary has seen many Mangrove restoration projects in that area, which have failed on account of communities choosing to support their livelihoods through shrimp and fish farms, destroying ecosystems in the process.[95] With this in mind, the most recent project has built close ties with members of the community, involving them in every stage of the rehabilitation process, seeking to provide alternative job opportunities for locals who are impacted by the pandemic, and working closely with communities to ensure the stability of the project and the delivery of ecosystem services.[96]

91 Fathima Mafaziya Nijamdeen, Thanne Walawwe Gedera, Hajaniaina A. Ratsimbazafy, Kodikara Arachchilage Sunanda Kodikara, Thenne Walawe Gedhara Fathima Ashara Nijamdeen, Thajudeen Thahira, Sofia Peruzzo, Farid Dahdouh-Guebas, and Jean Hugé. "Mangrove Management in Sri Lanka and Stakeholder Collaboration: A Social Network Perspective." Journal of Environmental Management 330 (March 2023): 117116. https://doi.org/10.1016/j.jenvman.2022.117116.

92 Ibid

93 Ibid

94 Times Online - Daily Online Edition of The Sunday Times Sri Lanka. "Unique Mangrove Restoration Project Takes Root in Puttalam," n.d. https://www.sundaytimes.lk/210131/news/unique-mangrove-restoration-project-takes-root-in-puttalam-431007.html.

95 Times Online (n 45)

96 "Empowering Communities: From Mangrove Restoration to Entrepreneurship in Anawilundawa," March 30, 2024.https://www.wnpssl.org/news/empowering_communities_mangrove_restoration_to_entrepreneurship_in_anawilundawa.html.

By prioritising community engagement and livelihoods, projects enhance the likelihood of achieving long-term conservation goals and preserving ecosystems indefinitely.

In countries, such as Kenya, where mangroves are nationally owned, the government has granted the rights for restoration projects and ownership of carbon to legally registered local cooperatives.[97] This structure solves a few issues traditionally associated with Blue Carbon. The first is ownership and the second is the distribution of funds. While foreign developers are known to invest in restoration and conservation projects in developing countries, the money rarely trickles down to local communities on the front lines.[98] Nationalisation could mean greater transparency over fund allocation. However, it raises further concerns around ownership and begs us to return to the concept of the commons. When public institutions claim ownership over natural resources while inferring collective responsibility, it becomes difficult to value a resource set to raise funds for specific recipients such as developers and local communities. Determining the distribution of funds and a fair price for carbon thereby becomes a more complex task than what developers may be prepared to quote on the market.

If Sri Lanka, in the context of its financial crises, chooses to pursue blue carbon financing within either of the two markets, funds must flow to communities. Carbon markets are often unregulated and rely on local legislature and international transparency to facilitate transactions. Political instability or a lack of clarity could mean that carbon prices fluctuate, leaving stakeholders in the dark as to whether the project is worth funding, this could further compound overall efforts to reach and finance the country's NDCs.

Nationally Determined Contributions - NDCs

Nationally Determined Contributions (NDCs) are at the heart of the Paris Agreement and the means of achieving long-term goals.[99] The Paris Agreement requires each party to prepare, communicate and maintain successive NDCs that it intends to achieve to reduce national emissions and adapt to the impacts of climate change. Information on the extent of blue carbon ecosystems is a minimum requirement to be able to include blue carbon in NDCs. Doing so will help align management actions with existing or developing international policies and national commitments to address climate change. Sri Lanka has a long history of consistent mangrove conservation and restoration. The total organic carbon stored in Sri Lanka's mangroves is estimated to be 30.21 Mt CO_2e with 1.25 Mt CO_2e stored in above-ground biomass and 28.96 Mt CO_2e stored in the upper 1 m of soil.[100] However, Mangrove soils of the Malwathu Oya estuary retain nearly 64% of the total blue carbon stock.[101] This is a higher amount than is reported by the intergovernmental Panel on Climate Change for mangroves in 2013.[102]

97 Martens, Els. "The Mangroves of Kenya: General Information. Compiled for Netherlands Wetlands Conservation and Training Programme, 1996." Kenya Wildlife Service, 1996.

98 Financial Times (n 43)

99 "Nationally Determined Contributions under the Paris Agreement." (n 7)

100 Perera, K. A. R. S., and M. D. Amarasinghe. "Assessment of Blue Carbon Stock of Mangroves at Malwathu Oya Estuary, Sri Lanka." OUSL Journal 16, no. 1 (June 30, 2021): 75. https://doi.org/10.4038/ouslj.v16i1.7519.

101 Ibid

102 Ibid

These mangrove areas, therefore, retain significant stock of blue carbon, especially in the soil. Despite their higher sequestration capacity and extensive coverage, mangroves have traditionally been classified within the forestry sector.[103] Under the United Nations Framework Convention on Climate Change, Sri Lanka has committed to increasing its forest cover to 32% of total land area by 2030. It is estimated that the implementation of updated Nationally Determined Contributions (NDCs) of the forestry sector will cause the increase of carbon sequestration capacity by 7% against a Business-as-usual scenario between 2021-2030.[104]

However, if mangroves are able to sequester higher amounts and are yet grouped within the forestry sector, this may lead to an underestimation of sequestration capabilities and variations between mangrove ecosystems, leading to inaccurate reporting on the country's ecosystems, which could in turn hinder Sri Lanka's fulfilment of its NDCs and its participation in global carbon markets. NDCs are one of the main avenues used to secure climate finance to support blue carbon related actions. For instance, The Bahamas' blue carbon crediting scheme, which is linked to its NDCs for both climate change mitigation and adaptation, has been used to reassure buyers that there are targets for their investments which can be used to measure the effectiveness of the scheme.[105] This gives investors the confidence that the government will deliver on their commitments to offset emissions. A clear articulation of NDCs are therefore critical milestones for accessing various climate funds.

Investing in Data and Research

Addressing data gaps through comprehensive baseline assessments is essential for effective monitoring and reporting on Blue Carbon initiatives.

Areas like the VNR (Vidutalituv Nature Reserve), for example, which has over 60% of its 29,000 hectares covered in seagrass, holds immense potential for blue carbon initiatives.

However, the lack of comprehensive data has hindered the implementation of targeted conservation efforts. Marine focused NGO's in Sri Lanka are currently funding assessments of the stocks and flows of seagrass within the VNR to evaluate their viability for a potential Blue Carbon project. These assessments, going forward, have the potential to provide much-needed data for effective conservation strategies and climate instruments. Projects like this have the potential to bridge the data gap and lead to better aligning financing mechanisms with the unique needs and value of Protected Areas.

Establishing baseline data is crucial for understanding the current state of these ecosystems and for future tracking of how ecosystem services and carbon sequestration evolve over time. While a precise nationwide seagrass mapping is not essential for developing a Blue Carbon project, a localized estimate within the project area is crucial.

103 "Nationally Determined Contributions Investment Plan." Ministry of Environment, 2023. https://env.gov.lk/web/images/pdf/policies/Final_NDC_IP_-_10072023.pdf.

104 Ibid

105 UNDP Sri Lanka, and Lakshman Kadirgamar Institute of International Relations and Strategic Studies. "Sri Lanka's Blue Economy," 2023. https://www.undp.org/sites/g/files/zskgke326/files/2023-12/blue_economy_position_paper_undp_and_lki.pdf.

Due to their dynamic nature and seasonal fluctuations, accurate mapping of seagrass habitats poses a considerable challenge. Since blue carbon projects typically operate on a regional scale, calculations are based on the seagrass coverage within the specific project area and other relevant factors.

Current efforts to estimate blue carbon in Sri Lanka's seagrass meadows underscore the urgent need for accurate and representative data. This data is vital for effective climate change reporting and for seamless integration into international frameworks like the Paris Agreement.

Incentivizing Private Sector Participation in Conservation Efforts

The substantial effort required for natural restoration underscores a broader issue - the lack of incentives for companies to invest in these initiatives.

Without government intervention to create beneficial formulas or mechanisms, investors won't sustain their efforts. While there are many entities interested in mangrove restoration, the lack of a proper policy for credit sharing means that Sri Lanka could potentially face challenges and fall behind.

Despite these challenges, the private sector in Sri Lanka is making notable strides in advancing climate action, often independent of government initiatives. These efforts primarily focus on climate adaptation and community mobilization for nature-based solutions. A prime example is the coral restoration project at Kayankani, launched in June through a public-private partnership.

Additionally, there are ongoing efforts to calculate bio credits for accreditation with the collaboration of Sri Lankan scientists. These initiatives often begin with small-scale pilot projects to establish scientifically sound models that can be replicated and scaled up.Furthermore, in exploring the establishment of incentives for private sector investment, fostering public-private partnerships are key considerations for future progress.

Biodiversity Sri Lanka (BSL), a network of over 100 private sector entities dedicated to biodiversity conservation, has actively engaged in public-private partnerships for forest and mangrove restoration. Since 2022, BSL has partnered with eight private sector companies to facilitate a mangrove restoration project at the Anawilundawa Ramsar Wetland. This project aims to restore 50 acres of land, focusing on both blue carbon initiatives and the overall health of the ecosystem. It is one such example of a successful public-private partnership.

Sri Lanka's Unique Position

Sri Lanka currently holds a unique position in its role as the Commonwealth Champion of Mangrove Ecosystems and Livelihoods, its recognition as a World Flagship Mangrove Restoration Drive, and its position as Chair of The Indian Ocean Rim Association (IORA) for the period of 2023-2025.[106] In 2018, 14 Commonwealth nations stepped forward to champion ten themes. Sri Lanka pledged to be the champion in mangrove ecosystems and livelihoods. Leading the Mangrove Ecosystems and Livelihoods Action Group' (MELAG) at the Commonwealth Heads of State meeting.

Sri Lanka has since kept that promise. Currently on track to restore 10,000 hectares of mangroves by 2030, these restoration efforts are estimated to benefit 5,000 households and create more than 4,000 new jobs.

However, in order to achieve these goals it needs additional funding of 3.5 million to support livelihood activities, maintain restoration sites and restore channels, as well as clean up boundary management, awareness raising and calculation of the value of carbon sequestered by the restoration of mangroves . Recently recognised as a World Restoration Flagship, Sri Lanka's mangrove restoration drive is now eligible for technical and financial support from the UN, which will bring it closer to realising its 2030 goals of restoring more than 50 percent of its mangrove cover. Additionally, the Australian Government has sought to support other countries across the Indo-Pacific region with assistance to help them incorporate blue carbon into their national inventories. This includes a collaboration with IORA, in which it will assist member states in building knowledge and capacity in protecting and restoring blue carbon ecosystems through the IORA Blue carbon hub. As the Chair of IORA, Sri Lanka is in a unique position as an advocate for blue carbon in the region, receiving technical support and ensuring that both livelihoods and ecosystems are strengthened and protected.

In alignment with Article 6, Sri Lanka signed a Memorandum of Understanding (MOU) with Singapore to collaborate on carbon credits.[107] Emphasizing guidelines provided by Article 6, the agreement plans to capitalise off of ITMOs, while sharing expertise on national regulatory frameworks, policies governing greenhouse gas mitigation, and efficient resource management.[108] Additionally, Sri Lanka has signed a Memorandum of Cooperation on the Joint Credit Mechanism for low carbon growth partnership with Japan.[109] By implementing proposed projects under this mechanism it plans to utilise new technologies and capacity building opportunities to generate green jobs and develop new infrastructure.[110]

106 EconomyNext. "Sri Lanka to Lead Global Mangrove Restoration: Commonwealth," June 22, 2019. https://economynext.com/sri-lanka-to-lead-global-mangrove-restoration-commonwealth-14518/.

107 "Singapore and Sri Lanka Join Forces on Impactful Carbon Credits," September 1, 2023. https://www.green.earth/news/singapore-and-sri-lanka-join-forces-on-impactful-carbon-credits.

108 Ibid

109 "Japan and Sri Lanka Sign Memorandum of Cooperation on the Joint Crediting Mechanism (JCM) for Low Carbon Growth Partnership – Presidential Secretariat of Sri Lanka," October 10, 2022. https://www.presidentsoffice.gov.lk/index.php/2022/10/10/japan-and-sri-lanka-sign-memorandum-of-cooperation-on-the-joint-crediting-mechanism-jcm-for-low-carbon-growth-partnership/.

110 Ibid

These initiatives, while preliminary, require concerted efforts on behalf of the government and local communities.

However, the Vidataltivu Nature Reserve (VNR) was de-gazetted on May 6 2024 to make way for an industrial aquaculture park in the area. The third largest Marine Protected Area in the island, the Nature Reserve is home to ecologically-strong mangrove ecosystems. If these ecosystems are exposed to aquaculture, it will destroy the soil sequestration capacity.[111] This would thereby reduce the potential for healthy blue carbon ecosystems to thrive in the region.

In order for Sri Lanka to achieve its NDCs and fulfil its international obligations and bilateral agreements, actions on the ground must reflect international promises. While it stands the chance to benefit from economic relief in the short-term, it would be foregoing the opportunity to scale up mitigation efforts and establish the adequate infrastructure needed to navigate a climate resilient world.

If Sri Lanka were to move forwards, it is imperative that it addresses regulatory complexities, enhances community engagement strategies, continues to invest in data collection and research to establish comprehensive baselines, and secures additional funding to achieve its ambitious restoration goals. Setting incentives for the private sector funding are also a key considerations in moving forward.

By leveraging international and local support and adhering to the guidelines outlined in agreements such as Article 6, Sri Lanka can continue to play a pivotal role in global efforts to combat climate change and preserve vital ecosystems for future generations.

111 "Unique Vidattaltivu Nature Reserve Under Threat - News - WNPS, Sri Lanka," n.d. https://www.wnpssl.org/news/unique-vidattaltivu-under-threat.html.

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