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Coastal Blue Carbon: Realising Opportunities Amidst Challenges

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Blue carbon is an emerging issue being discussed at various international and regional forums and programmes that look into climate change mitigation efforts. Numerous reports on both scientific and policy areas have been published on this subject in recent time. The Blue Carbon Initiative, a coordinated global programme focuses on mitigating climate change through the conservation and restoration of coastal and marine ecosystems. Its manual on 'Methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows' emphasises not only on the concept and need to conserve coastal ecosystems, but more importantly establishes a much needed internationally accepted measuring and monitoring procedure for carbon stocks and flux in coastal ecosystems. With a more specific emphasis on Malaysia and Goal 4 on addressing climate change under the Coral Triangle Initiative (CTI), this article reviews the status, gaps and challenges faced in the region and narrows down to needs at the national level, before making recommendations on addressing loopholes.

Introduction

Coastal ecosystems are among the most productive habitats on earth, providing essential ecosystem services and food security for human wellbeing. Mangroves, tidal salt marshes, and seagrasses provide numerous benefits such as coastal protection from storm surge, sea level rise and coastal erosions, regulating water quality and nutrient recycling, and supporting fisheries. Recent discussions have further highlighted another important area i.e., sequestration and carbon

storage from the atmosphere and oceans (termed as coastal blue carbon) towards mitigating impacts from climate change. It has been documented that coastal habitats contribute greater per unit long-term carbon sequestration as compared to terrestrial forests due to their efficiency in trapping suspended sediment and associated organic carbon during tidal inundation. Further, blue carbon is envisaged to be a cost-effective means to achieve positive climate change mitigation and adaptation outcomes, and hence frequently discussed in relation to carbon markets and climate finance opportunities. It has also moved on to receive considerable interest in terms of scientific and policy development at the international level; and hence the importance to highlight key details for further consideration in this region and at the national level.

In general, the blue carbon concept has been linked to the crucial need for conservation and protection of the coastal ecosystems from human activities and their threats, while mitigating climate change. The basic understanding is that when these coastal ecosystems are adversely impacted, their capacity to contribute to carbon sequestration is also impacted and the stored carbon would be released into the ocean and atmosphere, indirectly contributing to global climate change. Despite the benefits and ecological services they provide however, these ecosystems happen to be among the most threatened with dramatic losses being recorded around the globe. There has hence been some progress to include coastal ecosystems and blue carbon in policy and management mechanisms, although full realisation and integration has yet been accomplished especially in developing countries where most of these coastal ecosystems areas are generally found. It is envisaged that if this is achieved at its full potential, it would lead to additional coastal ecosystems restoration, conservation and protection at large towards optimising multiple benefits these ecosystems could provide.

A focus on the region: The Coral Triangle Initiative and actions on addressing climate change

Founded in 2007 by six countries in the region i.e., Indonesia, Malaysia, Papua New Guinea, the Philippines, Timor-Leste and Solomon Islands, the Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security (CTI-CFF) aims to address threats facing the coastal and marine resources in the region. Coastal populations in the region are highly dependent on coastal resources for their livelihoods and food security. The area is however already experiencing the impacts of climate change for instance severe storms, coastal inundation, rising sea level and sea surface temperatures. In order to ensure sustainable management of the marine and coastal environment and resources is achieved, the programme commits to five over-arching goals i.e., Goal 1: *Priority seascapes (or large marine areas) designated and effectively managed*, Goal 2: *Ecosystem approach to management of fisheries (EAFM) and other marine resources fully applied*, Goal 3: *Marine protected areas (MPAs) established and effectively managed*, Goal 4: *Climate change adaptation measures achieved*, and Goal 5: *Threatened species status improving*.

More specifically, Goal 4 on climate change adaptation (CCA) under the CTI programme focuses on reducing impacts of and adapt to climate change. For instance, a Region-wide Early Action Plan for Climate Change Adaptation (REAP) has been developed by the CTI member countries to put in place effective adaptation measures for coastal communities, besides investing on conducting climate change vulnerability assessments and work towards improving resilience of the coastal communities. Although blue carbon is not explicitly spelled out in the plan, the protection and conservation of the coastal habitats are however emphasised in the plan with a focus on natural and social resources adaptation actions.

Addressing key issues, gaps and challenges in the region

A number of publications on blue carbon ecosystems have touched upon the various aspects that should be considered as well as the gaps and challenges involved in realising the role and features that could be undertaken by implementing and practicing effective management of the coastal habitats for climate change mitigation. One major area include the need to quantify emissions and sequestrations of carbon based on disturbed, degraded, restored and natural blue carbon ecosystems to not only promote protection and conservation of these ecosystems, but to support also management and climate change mitigation plans. Reflecting this against the CTI, although a huge amount of work has been carried out in the region on a whole, knowledge gaps exist on the extent and coverage of the coastal ecosystems. For instance although mangroves have been fairly mapped, there is still a lack of information on the extent of seagrass beds in the region. The uncertainties vis-à-vis limitation in data on carbon sequestration and storage rates of blue carbon in the coastal ecosystems contributes further to a lack of focus on the matter in the region. The need to improve scientific understanding concerning the blue carbon ecosystems in the region is hence crucial – at scales that would be meaningful for policy development.

Achieving improved scientific understanding on carbon stocks and to monitor the changes would however require practical tools and guidance to enable the conduct of proper carbon analyses. This is particularly so in this region with present gaps in data and the lack of technical and financial resources for the purpose. In existence of new guidelines and methodologies that have been developed and made public via various publications in recent times, there is however often a mention of the need for international accepted procedures for carbon accounting in order to provide standardised techniques for carbon measurement and monitoring to support the assessment and accounting of blue carbon for management purposes. To support this, in general, a manual has recently been published to provide standardised methods for field measurements and analysis of blue carbon stocks and flux in the coastal ecosystems. The manual on *'Methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows'* by Howard et al. (2014) provide the relevant stakeholders the much needed information on step-by-step process for blue carbon assessment with key aims to support management and policy approaches, regulatory frameworks, as well as conduct analyses relating to carbon markets focusing on blue carbon stocks.

A further emphasis was placed on analysing the principle areas that would be crucial towards implementing effective blue carbon mechanism in this region. Available reports on the subject matter broadly illustrate the important of economic values, regulatory framework, social and political systems, as well as effective management, in addition to scientific understanding and data to support the blue carbon mechanism. On contrary, literature on blue carbon is currently dominated by technical papers and some policy commentaries, with a dearth of information especially relating to private and public sector finance, instruments and suitable tools, as well as the general lack of priority on investment priorities, and risks considerations associated to blue carbon ecosystems. Out of these however, only a handful publication actually emphasises focus on this region; and mostly in case-specific investigations that presume viability in a local context.

Situation in Malaysia

It has been largely acknowledged that the conservation, restoration and sustainable use of the coastal ecosystems would support climate change mitigation efforts, in addition to benefiting the communities from other services they provide such as fisheries resource and coastal protection. Countries have therefore begun to address the conversion and degradation of coastal blue carbon ecosystems through their national policies, management plans, and other activities. These include Indonesia, and to certain extent, coastal blue carbon related work in the Philippines which focuses on local scenarios and applications.

Emphasis and interest on blue carbon is also emerging in Malaysia, especially as a means to mitigate impacts of climate change, in addition to national obligations to the United Nations Framework Convention on Climate Change (UNFCCC) and related mechanism such as the Reducing Emissions from Deforestation and Forest Degradation (REDD+), as well as a means to indirectly support some of the activities and efforts under the CTI concerning climate change mitigation, and the National Climate Change Policy 2009. Specific work undertaken on blue carbon at the national level is however still limited at mostly at its infant stage. There are still various gaps and challenges that would need to be filled, and concerns addressed to ensure appropriate and adequate implementation would take place on coastal ecosystems to reduce the potentially significant emissions from their conversion and degradation. In general, there would firstly be a need to focus on increasing national understanding and capacity on the technical, policy and institutional aspects of emissions and removals of blue carbon sinks and reservoirs at the national level to ensure blue carbon is comprehensively included into the national level mitigation activities.

The way forward: Adopting and adapting key mechanisms towards improving the management of coastal ecosystems at the regional and national levels

Numerous policies, strategies and tools on coastal management have been designed, adopted and implemented at the global level for the conservation and restoration of coastal ecosystems. Policies and other related mechanisms on climate change mitigation such as the blue carbon ecosystems may offer an additional route and support for effective coastal management. Further, the potential of combining the best practices on coastal management into climate change

mitigation could present also the possibility to mobilise additional funds into conservation endeavours and result in a win-win for both climate regulation and habitat conservation. Towards achieving these, a few areas that would have to be addressed include the following:

- i) Increase awareness of the importance of coastal habitats for ecosystems services specifically including carbon sequestration and storage and the potential for increased emissions when these systems are degraded. This would require the inclusion of government and relevant implementation levels, in addition to the public and social communities to ensure broader support and understanding towards supporting implementation.
- ii) Analyse coastal carbon potentials in Malaysia and in the region towards developing national blue carbon action plans by identifying the opportunities, needs and limits. Among the necessary actions to include would be the need to update national data and inventories on coastal ecosystems distribution and extent, assessment of existing coastal carbon stocks and emissions from converted ecosystems from human activities to support mitigation efforts, as well as assessment of threats and drivers that lead to the degradation and loss of coastal carbon ecosystems.
- iii) Incorporate coastal blue carbon into existing coastal conservation initiatives, planning and management guidelines. There is a crucial need to establish a coordinated framework which includes also cross-sector planning towards ensuring effective implementation of related activities and plans concerning coastal and marine issues in the overall climate change mitigation efforts. The ultimate target would be to establish a legal framework that would allow integrated coastal carbon mitigation efforts to be part of the national climate change mitigation efforts.
- iv) Developing policy measures and financial incentives where needed to enhance climate change mitigation through conservation and restoration of coastal ecosystems as part of national climate change mitigation efforts. To achieve this, there would be a need to update and include blue carbon initiatives into the national climate change mitigation/control targets, strategies concerning low carbon actions, as well as national efforts concerning land use, land use change and forestry as a whole.
- v) Identify priority areas and pilot projects for carbon in coastal ecosystems at the national and regional levels to demonstrate implementation. This could also be further emphasised by integrating the blue carbon targets into Goal 4 of the CTI programme towards ensuring streamlined initiatives and targets at the regional and national levels in the region, and possibly also attract greater financial resources to support the implementation of related activities and initiatives.

Knowledge on the role of coastal ecosystems for carbon sinks has generally improved in the past few years through numerous research and publications. Threats to conservation, some uncertainties and gaps however remain and would need to be addressed in order to implement effective climate change mitigation strategies involving blue carbon ecosystems. These issues and gaps limit the capacity to formulate comprehensive and thorough actions involving blue carbon. As a start, the above listed suggestions could be applied as the way forward to ensure the conservation and restoration of blue carbon ecosystems to mitigate climate change in the region and at the national level.