# Safeguarding the Green Heart: India's Initiatives in Preserving Seagrass Meadows in the Bay of Bengal

**B** bcolp.blogspot.com/2024/04/safeguarding-green-heart-indias.html



Sanya D. Kishwar, Kritika Vatsa, and Sadqua Khatoon

The Bay of Bengal ('BoB'), often described as a "triangular basin spanning west to east between Sri Lanka, Bangladesh, and Malaysia" is a sprawling hub for trade and natural resource extraction.[1] Replete with minerals and fisheries, the Bay is a sustainer of livelihood, a tourist attraction, a revenue generator for the surrounding states and above all, a diverse marine habitat.[2] BoB's "large marine ecosystem" shelters mangroves, sea

grass beds and several endangered species.[3] Importantly, BoB is home to seagrass meadows.[4] Seagrass, an underwater plant, serves as a natural "carbon sink" by absorbing and storing significant amounts of carbon dioxide, making it a crucial element in climate change mitigation.[5] Additionally, seagrass has been found to filter coastal waters and enhance nutrient levels.[6] Though "under-represented" in climate change mitigation, seagrass ecosystems play a vital role in preserving the environment.[7] The United Nations Environment Programme emphasizes the significance of conserving and restoring seagrass meadows in the report, *Out of the Blue*, for effective climate change mitigation.[8] This blog attempts to discuss the preventive steps taken by India to conserve and restore the depleting seagrass meadows in Palk Bay, an inlet in the BoB. The authors comment critically on the role played by the state in climate change mitigation in the BoB region and attempt to list recommendations for better marine governance.

**Blue Economy as a threat to Palk Bay seagrass ecosystem**

India harbours coastal and marine seagrass meadows, with Palk Bay identified as a significant area holding most of the country's seagrass cover.[9] Hejnowicz et al. note that despite it being an efficient contributor to climate change mitigation, the conservation and restoration of seagrass meadows face insufficient attention.[10] There is a notable decline in the Palk Bay seagrass meadows, which are now being monitored as Ecologically Sensitive Areas by the National Centre for Sustainable Coastal Management in India.[11]

The Blue Economy ('BE') concept, originating from the 2012 United Nations Conference on Sustainable Development, aims to foster sustainable coastal management and marine utilization in the BoB states.[12]Despite the focus on sustainable development, the BE model poses environmental challenges, many of which were discussed recently at the G20 Research and Innovation Initiative Gathering ('RIIG') Conference.[13] While overfishing and hydrocarbon exploitation have concerned BoB states for decades, the issues are taking a serious turn due to their increased impact on seagrass.[14] Fishing practices such as bottom trawling have depleted the seagrass meadows in Palk Bay. [15] Bottom trawling involves dragging heavily weighted nets across the sea floor to catch fish, resulting in the uprooting of seagrass meadows as well as causing harm to dugongs, slow-moving sea creatures now listed as "vulnerable to extinction" by the International Union for Conservation of Nature.[16] India's pursuit of a leading BE role has unintended consequences, with subsidies shifting local fishers to large-scale, export-oriented fishing, potentially leading to illegal practices like bottom trawling. This raises concerns about overfishing, increased contribution to marine pollution and seagrass depletion

[17][18]

**Preserving Palk Bay: Recommendations and Way Forward**

According to the United Nations Framework Convention on Climate Change, the member countries are required to report their yearly carbon emissions along with an account of their efforts in reducing it. Blue carbon, absorbed and stored in the ocean, is crucial for

mitigating global warming.[19] The *High-Quality Blue Carbon Principles and Guidance* launched at COP27 guides the development and purchase of high-quality blue carbon projects and credits.[20] This framework aims to build confidence and momentum around blue carbon project development and investments. Notably, India has set a target to create a carbon sink of 2.50-3.00 billion tonnes by 2030, emphasizing the need to proactively conserve seagrass meadows, including blue carbon ecosystems.[21] One such step taken by the government is the Palk Bay Scheme, which was launched in 2017. The initiative aims at promoting deep-sea fishing to replace bottom trawling.[22] Apart from this, researchers from Manonmaniam Sundaranar University in the state of Tamil Nadu have initiated the establishment of a dugong conservation reserve in the Palk Bay with an aim to preserve the natural seagrass habitat of dugongs by curtailing bottom trawling in the region.[23] While the scheme sounds promising, it should be coupled with schemes that promote sustainable diving and boating since they also contribute to seagrass depletion apart from bottom trawling. Organizations like PADI and the Reef-World Foundation have been advocating for eco-friendly practices since 2018, and similar efforts should be encouraged in Palk Bay for optimal seagrass preservation.[24] Additionally, leveraging advanced technology, such as geospatial mapping and artificial intelligence, for seagrass bed mapping, as demonstrated by the University of Southampton in Studland Bay, can aid in evaluating and restoring seagrass health.[25] Incorporating this technology as a mandatory step in the Palk Bay Scheme can enhance the initiative's effectiveness. Adequate budget allocation by state governments to the fisheries sector for adopting sustainable fishing techniques is crucial. The Bay of Bengal faces challenges that require innovative solutions, and while modern technologies provide tools for monitoring and adapting, effective ocean governance remains essential. International collaboration, integrated management approaches, and a commitment to sustainability can pave the way for a prosperous and resilient future for the Bay's maritime region.

The Bay of Bengal stands at a critical point where the imperative to harness technological advancements for economic growth must be balanced with a commitment to sustainable practices. The region's rich biodiversity and economic significance demand a delicate balance to be struck, ensuring that progress does not compromise ecological integrity or jeopardize maritime safety. The surge in maritime traffic, facilitated by advanced navigation and communication technologies, heightens the risk of accidents and collisions, posing threats to both human life and marine ecosystems. The challenges and opportunities posed by modern technology in the Bay of Bengal necessitate a proactive and adaptive approach to mitigate environmental and safety concerns. By carefully navigating this balance, stakeholders can safeguard not only the region's ecological diversity but also human lives and the vitality of marine ecosystems.

*Sanya D. Kishwar, Assistant Professor, O.P. Jindal Global University, Sonipat, India.*

*Kritika Vatsa, Student, O.P. Jindal Global University, Sonipat, India.*
*Sadqua Khatoon, Student, Aligarh Muslim University, Aligarh, India.*

*[This article achieved the second position in the 2023 Law of the Sea Blog Competition, hosted by BCOLP in memory of Professor M. Habibur Rahman (1946 – 2022).]*

**Notes:**

---

[1] Naha, A. (2022). Geostrategic Significance of the Bay of Bengal in India's Maritime Security Discourse. *The Journal of Territorial and Maritime Studies, 9*(2), 47-64. https://doi.org/10.2307/JTMS.9.2.47/. See also Karim, T. (2021, May 12). The Importance of the Bay of Bengal as a Causeway between the Indian and Pacific Oceans. *Asia-Pacific Bulletin*. http://www.jstor.org/stable/resrep32272

[2] Khan, A. (2019). Georesource potential and geohazard status of the Bay of Bengal vis-à-vis sustainable development of 'blue economy'. *BMJ, 3*, 51; Rahman, M. A., Mahbub-E-Kibria, A. S. M., & Chowdhury, K. A. (2017). Economic Benefits from the Bay of Bengal Ecosystem Services. *Int. J. Sci. Res., 6*, 1994; Dandapath, P. K., & Mondal, M. (2013). Urbanization and its impact on coastal eco-tourism in West Bengal. *International Journal Science and Research, 2(1),* 115; Xavier, C., & Palit, A. (2023). Introduction. In Xavier, C. & Palit, A. (Eds). *Connectivity and Cooperation in the Bay of Bengal Region* (pp. 6). Centre for Social and Economic Progress; Golder M., Shammi, A., Rouf, M. (2022). Enhanced Awareness to Coastal Ecology: Protecting Endangered Species of the Bay of Bengal. *Oceanography & Fisheries Journal, 15(1),* 1-12. https://doi.org/10.19080/OFOAJ.2022.15.555904

[3] Brewer, D., Hayes, D., Lyne, V., Donovan, A., Skewes, T., Milton, D., & Murphy, N. (2015). An Ecosystem Characterisation of the Bay of Bengal. *Bay of Bengal Large Marine Ecosystem Project (BOBLME)*. 3. http://hdl.handle.net/1834/34573

[4] Patro, S., Krishnan, P., Samuel, V. D., & Ramachandran, R. (2017). Seagrass and Salt Marsh ecosystems in South Asia: An Overview of diversity, distribution, threats and conservation status. In Prusty, B., Chandra, R. & Azeez, P. (Eds.), *Wetland Science* (pp. 87-104). Springer.

[5] Holmer, M. (2018, November 1). *Underwater Meadows of Seagrass Could Be the Ideal Carbon Sinks*. Smithsonian Magazine. https://www.smithsonianmag.com/science-nature/underwater-meadows-seagrass-could-be-ideal-carbon-sinks-180970686/

[6] Short, F. T., & Short, C. A. (1984). The Seagrass Filter: Purification Of Estuarine and Coastal Waters. In Kennedy, V. (Ed.), *The Estuary as a Filter* (pp. 395–413). Elsevier.

[7] Daru, B. H., and Rock, B. M. (2023). Reorganization of seagrass communities in a changing climate. *Nature Plants*, *9,* 1034-1043. https://doi.org/10.1038/s41477-023-01445-6

[8] UNEP. (2020, December 11). *Out of the blue: the value of seagrasses to the environment and to people*. United Nations Environment Programme. https://www.unep.org/resources/report/out-blue-value-seagrasses-environment-and-people

[9] Geevarghese, G., Akhil, B., Magesh, G., Krishnan, P., Ramachandran, R., & Ramachandran, R. (2018). A comprehensive geospatial assessment of seagrass distribution in India. *Ocean & Coastal Management, 159,* 16–25. https://doi.org/10.1016/j.ocecoaman.2017.10.032

[10] Hejnowicz, A. P., Kennedy, H., Rudd, M. A., & Huxham, M. (2015). Harnessing the climate mitigation, conservation and poverty alleviation potential of seagrasses: prospects for developing blue carbon initiatives and payment for ecosystem service programmes. *Frontiers in Marine Science, 2*, 1-22. https://doi.org/10.3389/fmars.2015.00032

[11] Ganguly, D., Singh, G., Ramachandran, R., Bhatta, R., & Selvam, A. (2018). Valuing the carbon sequestration regulation service by seagrass ecosystems of Palk Bay and Chilika, *India. Ocean & Coastal Management, 159,* 26–33. https://doi.org/10.1016/j.ocecoaman.2017.11.009

[12] UNCTAD. (2014). *The Oceans Economy: Opportunities and Challenges for Small Island Developing States*. UNCTAD. https://unctad.org/system/files/official-document/ditcted2014d5_en.pdf; Godfrey, S. (2016). Defining the Blue Economy, Maritime Affairs: Journal of the National *Maritime Foundation of India, 12(1)*, 58-64, https://doi.org/10.1080/09733159.2016.1175131

[13] Martínez-Vázquez, R. M., Milán-García, J., & De Pablo Valenciano, J. (2021). Challenges of the Blue Economy: evidence and research trends. *Environmental Sciences Europe, 33(1)*, 1-17. https://doi.org/10.1186/s12302-021-00502-1; PIB. (2023, May 19). *Scientific challenges and opportunities for a sustainable blue economy discussed at G20 RIIG Conference at Diu*. Press Information Bureau. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1925547

[14] Vivekanandan, E., Hermes, R., & O'Brien, C. (2016). Climate change effects in the Bay of Bengal Large Marine Ecosystem. *Environmental Development, 17,* 46–56. https://doi.org/10.1016/j.envdev.2015.09.005; Singh, A. (2020, October). *Towards an Integrated 'Blue Economy' Framework in the Bay of Bengal*. Observer Research Foundation. https://www.orfonline.org/wp-content/uploads/2020/10/ORF_IssueBrief_411_BIMSTEC-BlueEconomy.pdf

[15] Purohit, M. (2017, November 28). *Palk Bay: Trawled and damaged*. India Water Portal. https://www.indiawaterportal.org/articles/palk-bay-trawled-and-damaged

[16] Amoroso, R. O., Pitcher, R., Rijnsdorp, A., McConnaughey, R. A., Parma, A. M., Suuronen, P., Eigaard, O. R., Bastardie, F., Hintzen, N. T., Althaus, F., Baird, S. J., Black, J., Buhl-Mortensen, L., Campbell, A. B., Catarino, R., Collie, J. S., Cowan, J. H., Durholtz, D., Engstrom, N., Jennings, S. (2018). Bottom trawl fishing footprints on the

world's continental shelves. *Proceedings of the National Academy of Sciences of the United States of America, 115(43)*, 10275-10282. https://doi.org/10.1073/pnas.1802379115; Hiddink, J. G., Jennings, S., Sciberras, M., Szostek, C. L., Hughes, K. M., Ellis, N., Rijnsdorp, A., McConnaughey, R. A., Mazor, T., Hilborn, R., Collie, J. S., Pitcher, C. R., Amoroso, R. O., Parma, A. M., Suuronen, P., & Kaiser, M. J. (2017). Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance. *Proceedings of the National Academy of Sciences of the United States of America, 114(31),* 8301–8306. https://doi.org/10.1073/pnas.1618858114; Marsh, H. & Sobtzick, S. (2019). *Dugong dugon (amended version of 2015 assessment).* The IUCN Red List of Threatened Species. https://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T6909A160756767.en

[17] Selvam, T. A. (2021). A study on Fisheries: Government schemes and support in India. *International Journal of Applied Research, 7(8)*, 241–242. See also Damle, H. (2017, October 23). *Financial Analysis of the Blue Economy: Sagarmala's Case in Point Centre for Financial Accountability*. CENFA. https://www.cenfa.org/wp-content/uploads/2017/10/blue-economy-financial-analysis.pdf; Singh, A. (2022). Port Development: history, present and future challenges. In Jadhav, P. & Choudhary, R. (Eds.), *Infrastructure and Control* (pp. 25–34). Springer. See also Barbesgaard, M. (2017). Blue growth: savior or ocean grabbing? *The Journal of Peasant Studies, 45(1),* 130–149. https://doi.org/10.1080/03066150.2017.1377186

[18] Cummings, G., Greenberg, Z. (2022). Sustainable Tourism in the Context of the Blue Economy. In Leal Filho, W., Azul, A.M., Brandli, L., Lange Salvia, A., Wall, T. (Eds.), *Life Below Water* (pp. 1-14). Springer.

[19] Thomas, S. (2014). Blue carbon: knowledge gaps, critical issues, and novel approaches. *Ecol. Econ. 107,* 22–38. https://doi.org/10.1016/j.ecolecon.2014.07.028; Nellemann, C., Corcoran, E. C., Duarte, C. M., Valdés, L., De Young, C., Fonseca, L., & Grimsditch, G. (2009). Blue Carbon: The Role of Healthy Oceans in Binding carbon. A Rapid Response Assessment. In *United Nations Environment Programme*. eBooks.

[20] Meridian Institute. (2022). *High-quality blue carbon principles and guidance - Meridian Institute*. https://merid.org/wp-content/uploads/2022/11/HQBC-PG_FINAL_11.8.2022.pdf

[21] Sharma, J. (2021, May 30). *Enhancing Carbon Sink through Forestry in India*. TERI. https://www.teriin.org/project/enhancing-carbon-sink-through-forestry-india

[22] Ramakrishnan, T. (2021, October 8). *Palk Bay scheme to get a fillip: Murugan*. The Hindu. https://www.thehindu.com/news/national/tamil-nadu/palk-bay-scheme-to-get-a-fillip-murugan/article36901746.ece

[23] Chaitanya, S. K. (2021, September 4). India's 1st dugong conservation reserve to be in Tamil Nadu. *The New Indian Express*. https://www.newindianexpress.com/states/tamil-nadu/2021/sep/04/indias-1st-dugong-conservation-reserve-to-be-in-tn-2354056.html

[24] Reef-World. (2019, March 13). *PADI and The Reef-World Foundation embark on a global venture to make sustainable diving the social norm*. The Reef-World Foundation. https://reef-world.org/blog/2018/11/23/press-release-padi-and-the-reef-world-foundation-embark-on-a-global-venture-to-make-sustainable-diving-the-social-norm

[25] Eigaard, O., Bastardie, F., Hintzen, N., Buhl-Mortensen, L., Buhl-Mortensen, P., Catarino, R., Dinesen, G., Egekvist, J., Fock, H., Geitner, K., Gerritsen, H., González, M., Jonsson, P., Kavadas, S., Laffargue, P., Lundy, M., Gonzalez-Mirelis, G., Nielsen, J., Papadopoulou, N., Posen, P., Pulcinella, J., Russo, T., Sala, A., Silva, C., Smith, C., Vanelslander, B., & Rijnsdorp, A. (2017). The footprint of bottom trawling in European waters: distribution, intensity, and seabed integrity. *ICES Journal of Marine Science*, *74(3),* 847–865. https://doi.org/10.1093/icesjms/fsw194; Southampton Marine and Maritime Institute. (2023, July 6). *Southampton's geospatial research informing seagrass conservation spotlighted in UK Geospatial Strategy 2030.* University of Southampton. https://www.southampton.ac.uk/smmi/news/2023/07/06-geospatial-research-informing-seagrass-conservation.page