

Progressive Carbon Sequestration Over Time

The introduced GHG-smart livelihood interventions (such as resilient crop farming, agroforestry, and seaweed farming) contribute to gradual carbon sequestration over a six-year transition period, where the system progressively captures CO₂ from the atmosphere through natural and agricultural processes.

Peak CO₂ Removal in 2029

The forecast indicates that CO₂ sequestration will reach its maximum efficiency in 2029, with removal volumes peaking at 444,605 MT per quarter in Q1 and 741,009 MT per quarter in Q3. This period represents the highest rate of carbon uptake before the system gradually stabilizes, approaching equilibrium as the carbon cycle balances potential greenhouse gas (GHG) reductions.

Long-Term Equilibrium and GHG Offset

After the peak phase, the sequestration rate stabilizes toward equilibrium, indicating a balanced carbon cycle. This stage demonstrates the potential for sustained GHG reduction, supporting climate resilience, soil health, and ecosystem restoration in the study area.

Muhammad Abdur Rahaman, Mazharul Kabir, Khaled MD. Mehzabin Alam Prottoy, MST Shamima Akter, Asma Akter, Amreen Islam, Mahib Mahatasim

Greenhouse gas emissions from livelihood activities in Bangladesh are primarily driven by agriculture, especially livestock, rice cultivation, and fertilizer use, which contribute significant methane and nitrous oxide emissions.

🌀 **Livestock:** Enteric fermentation from ruminants (cows, goats) and manure management are significant sources of methane.

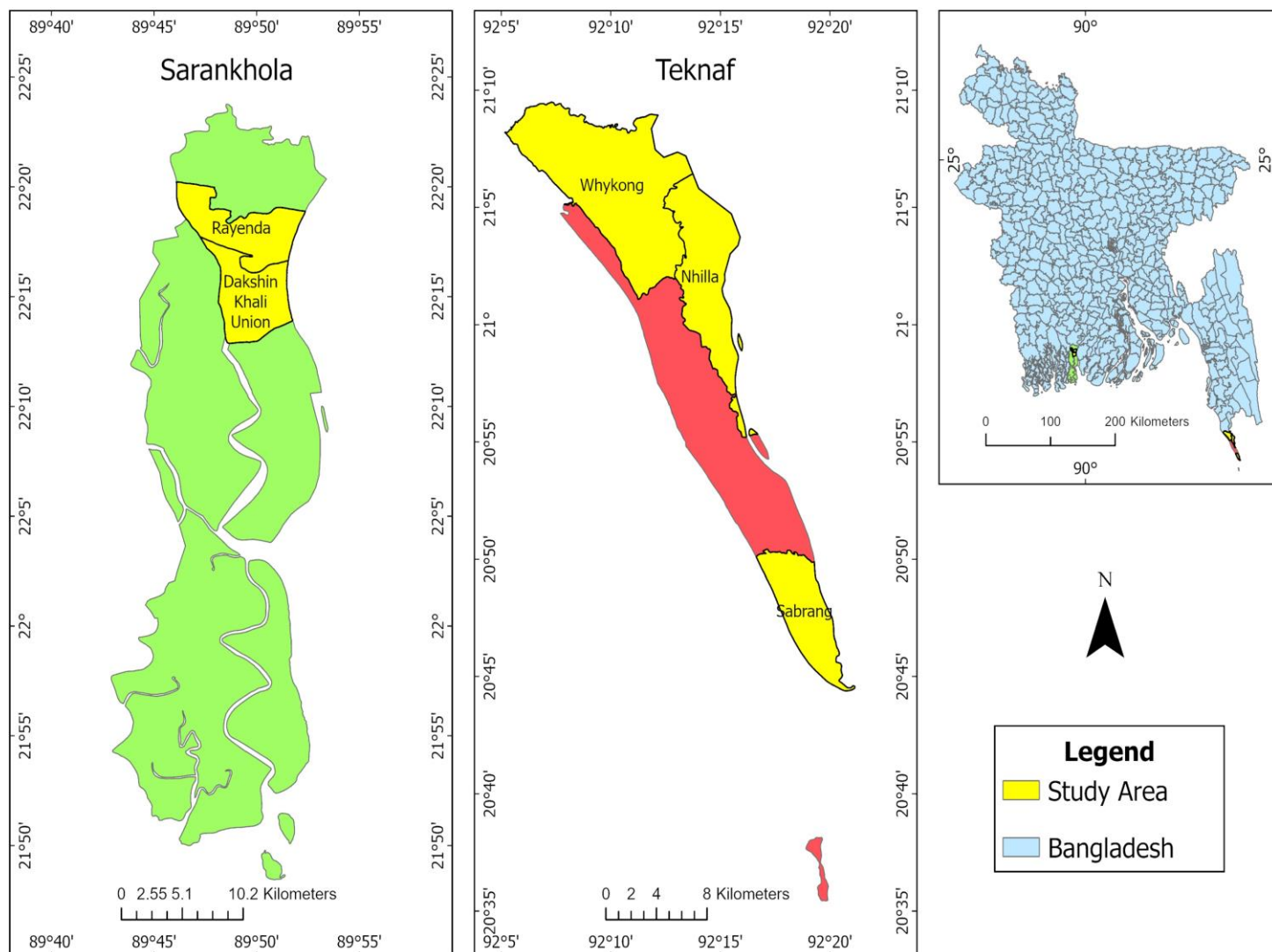
🌀 **Rice Cultivation:** A major contributor to methane emissions in Bangladesh's agricultural sector.

🌀 **Fertilizer Use:** Direct and indirect emissions of nitrous oxide from fertilizer application are a substantial source.

🌀 **Crop Residue Burning:** Burning of field residues contributes to emissions.

The process of implementing GHG-smart livelihood activities in Bangladesh involves adopting climate-smart agriculture (CSA) practices like alternative wetting and drying (AWD) for irrigation and deep placement of fertilizers to reduce emissions from rice farming. It also includes promoting environmentally friendly microenterprises, which focus on resource efficiency and resilience. Additionally, the process includes diversifying crops to include nutritious, climate-resilient neglected species and developing green growth solutions through capacity building, knowledge dissemination, and technological adoption within vulnerable communities. Also, promotion of diversified nature-based livelihood interventions can contribute to GHG sequestration in Bangladesh.

A study was conducted in three unions (Hnila, Whykong, and Sabrang) of Teknaf Upazila of Cox's Bazar district and two unions (Rayenda and Southkhali) of Sarankhola Upazila of Bagerhat District to identify potential GHG-smart livelihood options and their contribution to GHG sequestration.

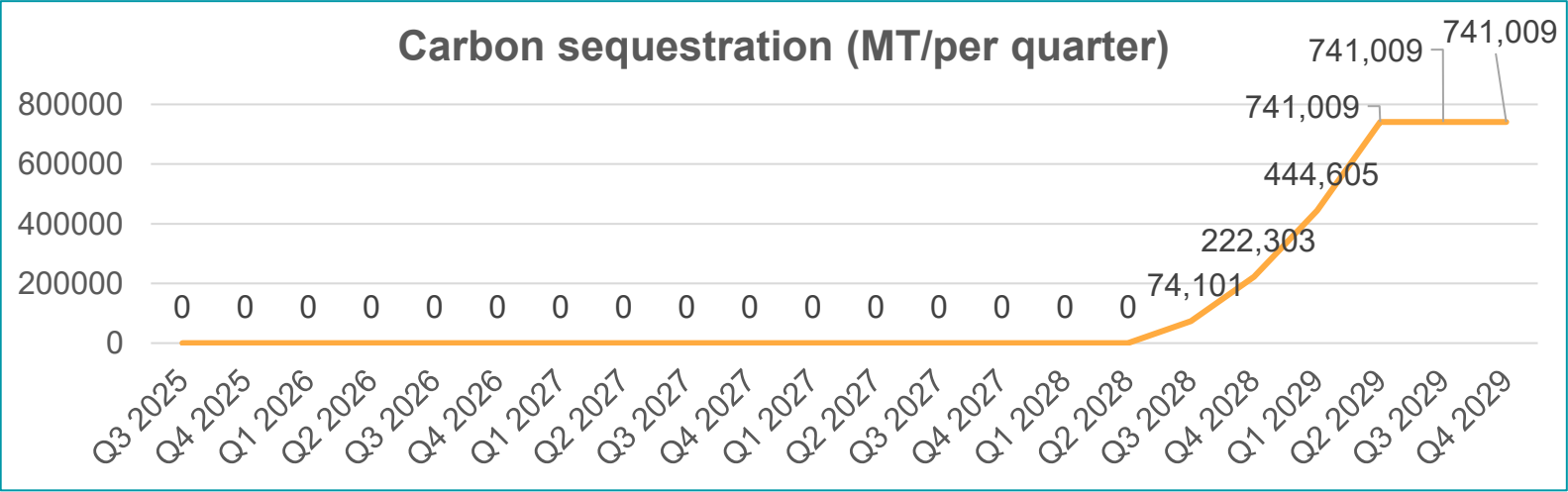
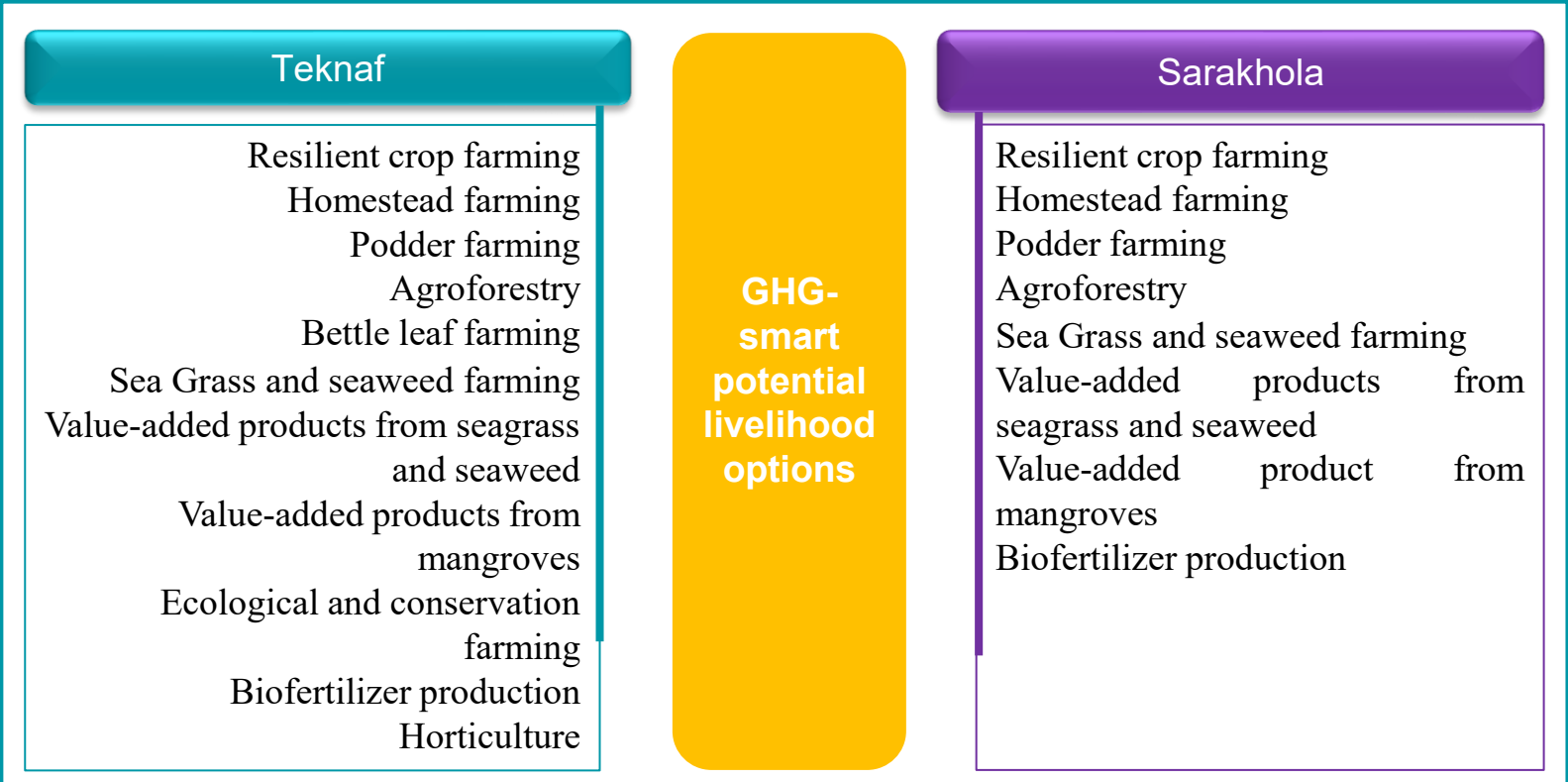


Study area

For the study area, GHG-smart potential livelihood interventions such as resilient crop farming, homestead farming, forage farming, etc., are introduced by concentrating on both emissions reduction and carbon sequestration. These potential livelihoods are deemed to be very important interventions for the community people in terms of GHG reduction. These GHG-smart livelihood interventions will improve soil health, water retention, sustainable agriculture, and climate resilience, all of which significantly align with the GHG reduction target.

In Figure 5.4, A series instance of carbon sequestration is indicated as quarterly (year) vs. carbon sequestration volume. It is a forecast schedule over a 6-year transition period, which shows that CO₂ removals peak in 2029,

quarter-1 (Q1) CO₂ sequestration 444,605 (MT/per quarter), and quarter-3 (Q3) CO₂ sequestration 741,009 (MT/per quarter). Hereafter, they will approach equilibrium by gradually balancing the carbon cycle in offsetting potential greenhouse gas (GHG) reduction.



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