

# Potential Role of Grasslands in Carbon Capture and Storage

Jayson S. Cabral

Institute of Environmental Science and Meteorology

University of the Philippines – Diliman

Quezon City

## Abstract

Grasslands are important components of the global carbon cycle due to their capacity to store substantial amounts of carbon, particularly in soils, yet they remain underrepresented in climate mitigation strategies and are often undervalued relative to other land uses. Given the tropical nature of the Philippines, grasslands can readily proliferate even in areas with poorly developed soil profiles, highlighting their adaptability and potential contribution to carbon storage across marginal landscapes. This candidacy manuscript synthesizes current understanding of grassland carbon capture and storage, examining how biogeochemical processes, mineralogical properties, and management practices influence carbon storage dynamics.

Building from this synthesis, the manuscript proposes an integrated approach for grassland carbon assessment and valuation based on three dimensions: quantity, permanence, and stability. The framework recognizes that carbon value depends not only on the amount stored, but also on its duration of storage and resistance to disturbance, with permanence and stability acting as modifiers of carbon value. It further incorporates land use trade-offs to support a differentiated zoning approach for guiding land-use decisions across grassland systems.

**Keywords:** grasslands, soil organic carbon, carbon capture and storage, permanence, stability, carbon valuation; land use trade-offs