

# Development of Tier 2 Estimation Method for Carbon Absorption of Biomass in Grassland to Respond Climate Change Adaptation

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## Extended Abstract

Grassland has been underestimated in carbon absorption capacity by assuming that carbon stock change of biomass is zero in Tier 1 method of the IPCC guidelines. A simplified estimation method would be appropriate in Tier 1 because of the applicable data and different circumstances by country, but the Tier 2 method requires a scientific approach that could reflect the grassland ecosystem. This study aims to select variables applicable to the Tier 2 method for grassland biomass, and to develop a formula quantifying carbon absorption. The national inventory report of 17 countries were analyzed to review the calculation method for biomass in grassland. The formula of carbon absorption is developed based on the land cover within grassland. As a result of reviewing the calculation method, four countries adopt Tier 2 and thirteen countries either do not account for biomass or are only considering soil carbon according to Tier 1 criteria. An equation of carbon absorption for grassland biomass was developed consisting of grazing land, forage cropland, unproductive grassland, vegetation, and loss for wildfires integrating the calculation methods of each country. The unproductive grassland and vegetation are classified as forest or cropland depending on the identification of grassland, but they are involved as grassland in the spatial data-based method. The biomass of grazing and forage cropland is composed of the above-ground, below-ground part, consumption by livestock, and forage crop yield, the entire carbon absorption is expressed as the sum of them. However, carbon accumulation of grassland biomass is underestimated as current greenhouse gas calculation does not include annual carbon absorption from atmosphere and additional carbon stock by livestock activities. Even in countries that have adopted the Tier 2 method, the carbon fixation capacity of grassland could not accurately calculate because the same contents as Tier 1 countries are applied. In order to perform Tier 2 level calculation beyond Tier 1 method using statistical data, carbon absorption of grassland biomass should be considered, it allows that calculation of greenhouse gas in each country's grassland sector can be performed scientifically.

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