Journal of Environmental and Occupational Health, 2023
VOL 13, NO. 09, PAGE 01-13

RESEARCH ARTICLE

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Carbon Stock Potential of Shilabo Shrubs Land among Soil Texture Somali Region, Eastern Ethiopia

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ABSTRACT

Forests, shrubs and grasslands play an imperative role in climate change mitigation and balancing nature by sequestering and retaining carbon above and below the ground in biomass. The study was conducted to determine the total carbon stock potential of shrub lands in Shilabo district, Somalia, Ethiopia, as well as the implications for climate change mitigation. The study was restricted to the carbon stock potential of the shrub land depending on soil texture for three major carbon pools: Above Ground Biomass (AGB), Below Ground Biomass (BGB) and Soil Organic Carbon (SOC). Using generic allometric equations that are readily available, the biomass of each species of tree and shrub was determined. To gather the necessary and pertinent data for the study region at every 390 m between each sample plot and 700 m between each transect line, sample plots of 20 by 20 m were established using systematic random sampling techniques. Using Breast Height (BH) tape, standing trees with branches and twigs measuring 5 cm or less in Diameter at Breast Height (DBH) were measured on 400 m^2 of sample plots. The height of the trees was also assessed using a hypsometer. Each of the five 1 x 1 m shrub land subplots, one in the middle and four at the corners of the main plot, had litter samples carefully taken from it. Litter samples from each of the five subplots of the main plot were combined to create a composite sample that weighed about 100 grams. Each of the five 1 by 1 m subplot regions, one at each of the four corners and the main plot's center, had samples of soil organic carbon and bulk density taken at a depth of 30 cm using an auger. The Statistical Package for Social Science (SPSS) software version 26 was used to estimate and assess the carbon stock of various carbon pools. The findings demonstrated that the below ground and above-ground biomass total mean carbon stocks at the sandy loam and sandy textured soil sites were approximately 507.36 t ha and 297.24 t ha, respectively. An independent sample t-test revealed that the mean difference in carbon pool and carbon dioxide sequestration between sandy loam texture soil (site 1) and sandy texture soil (site 2) was statistically significant. Shrub lands have provided great environmental benefits and services, as well as mitigating climate change impacts. Therefore, any environmental protection agencies, both government and non-government, have to look for and protect this resource.

ARTICLE HISTORY

Received: 13-Apr-2023, Manuscript No. JENVOH-23-95640; Editor assigned: 17-Apr-2023, PreQC No. JENVOH-23-95640 (PQ); Reviewed: 02-May-2023, QC No. JENVOH-23-95640; Revised: 21-Jun-2023, Manuscript No. JENVOH-23-95640 (R); Published: 28-Jun-2023

Keywords:

Carbon dioxide equivalent; Carbon emission; Biomass; Climate change; Sequestration; Mitigation

Introduction

Background of study

Global warming and its subsequent climate change can have major adverse effects on many life forms on earth [1]. Increasing economic development coupled with accelerated urbanization has led to a rapid increase in anthropogenic carbon dioxide emissions. This has resulted in increased carbon dioxide concentrations in the atmosphere, which have led to rising global temperatures [2]. Land use changes, such as forest clearance for agriculture, settlement, and industrial expansion to the atmosphere over the last 150 years.

Carbon emissions from deforestation and forest degradation are the second largest source of anthropogenic carbon emissions [3]. Historically, the conversion of land use from forests and grasslands to intensive agricultural cropping systems has also contributed to the increase in atmospheric CO_2 [4].

Terrestrial habitats significantly contribute to climate change mitigation by sinking greenhouse gases [5]. Carbon (C) sequestration is considered one of the main cost effective tools (one of the natural climate solutions) to mitigate climate change *via* reducing GHG concentrations in the atmosphere [6].

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