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CO₂ Capture Capacity Measurement Using Multitemporal Analysis and Biophysical Variables in a Tropical Humid Forest in the Colombian Andes

[Sustainability \(Switzerland\)](#) • Article • [Open Access](#) • 2024 • DOI: 10.3390/su16114809

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Abstract

This study analyzed the CO₂ capture potential for the Parque Natural Regional Serranía de las Quinchas buffer area in Colombia. For this purpose, multitemporal analysis for land covering for the years 1989, 2000, 2006, 2011, 2017 and 2021 was performed using the normalized difference vegetation index (NDVI) for each cover and land cover (LC) methodology. In the same way, aboveground biomass (AGB) was measured for representative parcels by measuring tree diameters and heights and applying adequate allometric models; carbon content in soils was measured too. The results showed that carbon content in soils is higher than that in aboveground biomass. Average values for the tree parcels were above 2 times the value recorded for average tropical humid forests, and one of them had a value 7 times this value. A very interesting potential for existing forest recovery was found for this area. Strategies for this include the development of sustainable practices, land use management, biodiversity preservation and the participation and leading of the local communities. © 2024 by the authors.

Author keywords

aboveground biomass; carbon stock; Colombia; geographic information systems; land cover; remote sensing data; spatiotemporal analysis; vegetation indices

Indexed keywords

Regional Index

Andes; Colombia

GEOBASE Subject Index

aboveground biomass; biodiversity; carbon sequestration; land cover; land use; NDVI; satellite data; spatiotemporal analysis; tropical forest

Funding details

Details about financial support for research, including funding sources and grant numbers as provided in academic publications.

Funding sponsor	Funding number	Acronym
Universidad Santo Tomas	AMB-2022-01	

Funding text

This research was funded by Universidad Santo Tomas, Seccional Tunja, Colombia. Funding number: AMB-2022-01.

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Abstract

This study analyzed the CO₂ capture potential for the forest in Colombia. For this purpose, multitemporal analysis from 2010 and 2021 was performed using the normalized difference vegetation index (LC) methodology. In the same way, aboveground biomass was measured by measuring tree diameters and heights and applying allometric equations measured too. The results showed that carbon content values for the tree parcels were above 2 times the value that they had a value 7 times this value. A very interesting finding is that the strategies for this include the development of sustainable forest management, preservation and the participation and leading of the community.

Author keywords

Detailed information



PubMed ID	
Source type	Journal
ISSN	20711050
Publisher	Multidisciplinary Digital Publishing Institute (MDPI)
Publication year	2024
Source title	Sustainability (Switzerland)
Volume	16
Issue	11
Article number	4809

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Water science library: Nature-based solution to the hydrosocial cycle, La Honda neighborhood, Medellín-Colombia

[Cienciateca del agua: solución basada en la naturaleza del ciclo hidrosocial, barrio La Honda, Medellín-Colombia]

[Revista 180](#) • [Article](#) • [Open Access](#) • 2024 • DOI: 10.32995/rev180.Num-54.(2024).art-1265

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Abstract

The hydrosocial cycle refers to the historical, geographical and anthropological link that populations have developed with water processes in the territory stated by Colombia Anfibia (2015) (Jaramillo Villa et al., 2016). In this context, we found a gap in the lack of studies focused on the analysis of anthropic adaptation processes to the watersheds of the city of Medellín, specifically in the La Honda ravine, located in the homonymous neighborhood of commune 3 Manrique (Medellín). The present work, in harmony with the Medellín Climate Action Plan, aims to investigate the hydrosocial cycle of the neighborhood and the La Honda ravine, through a research synergy between the Universidad Santo Tomás (branches of Medellín and Bucaramanga), the Institute of Human Rights, Reconciliation and Peace (USTAMED) and the local community. During the investigation, the participatory methodology Transformative Actions La Honda has been implemented, structured in three main moments, called: Building ties, Co-creation and Creation workshop, which has allowed to establish ties between civil society and the academic community on fundamental topics such as: Sustainable environmental development, Human rights,

construction of public policy and peace scenarios. Having as main conclusions some architectural design premises as "Solutions based on nature", jointly developed by the population of the neighborhood, students and research teachers, with the purpose of reaching in the future a work built linking public-private entities. © 2024 Universidad Diego Portales. All rights reserved.

Author keywords

anthropology; Architecture; climate change; hidrosocial cycle; Medellín; social cartography

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Detailed information



Publication date	December 2024
PubMed ID	
Source type	Journal
ISSN	07182309
Publisher	Universidad Diego Portales
Publication year	2024
Source title	Revista 180
Issue	54
Pages	100 - 126

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