

# **The Role of Co-Operatives in Reducing Greenhouse Gas Emissions and Enhancing Sinks Through Land Use, Land-Use Change and Forestry in Tanzania**

**By**

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## **Abstract**

The study explored the role of co-operatives in reducing greenhouse gas (GHG) emissions and enhancing sinks through land use, land use change and forestry (LULUCF) in agroforestry systems and miombo woodlands in Moshi and Urambo districts respectively. The general objective of the study was to determine the role of co-operatives in reducing greenhouse gas emissions and enhancing sinks through land use, land use change and forestry

Specifically, the study sought to:

- Assess the drivers of land use and land-use changes associated with cooperative actions linked to carbon emissions reduction and enhancing carbon sinks
- Examine the extent to which co-operative activities have contributed to mitigating (weaning) GHG emissions from land use change
- Determine the contribution of co-operatives in maintaining carbon stocks in agroforestry cropping systems and miombo woodland agro-ecosystems
- Assess the potential of co-operative marketing approach in enhancing carbon trading in community managed carbon enhancement activities.

This study employed a number of competing theories which was proposed so as to make a clear understanding on the potential role of co-operatives in reducing emissions and enhancing carbon sinks through LULUCF. The theories were:

- The political ecology approaches

The political ecology approach engages with the social world and views the environment as not simply a stage or arena in which struggles over resource access and control take place, but also consider nature or biophysical processes that play an active role in shaping human environmental dynamics.

- Economic theory of co-operatives

An economic theory of the co-operative enterprise is based on cost minimization; it puts emphasis on the improvement of members' livelihood objectives than profit maximization. While human society is broad, the co-operative organization is a set of individuals of the same human society, who have been organized in order to meet their cultural, economic and social aspirations within the framework of sustainable development.

- Marxist class theory of co-operation

The Marxist class theory of co-operation states that a system of co-operative firms is not only feasible, but bound to assert itself in history and that it gives rise to a new production mode in which wage labour is swept away and the means of production (capital) is no longer used to enslave workers. Under this theory of cooperation, co-operatives are necessary for addressing the poverty

conditions of small farmers and how co-operatives can assist them to access market advantages than when they are on their own, especially their protection against price exploitation.

- The human development theory

Human development theory emphasizes that human development should, among other things, be measured by the enhancement of human capabilities through education and training in order to avail themselves with existing opportunities to remove impediments to their own development. One of those impediments was poverty. Entering the carbon trade industry with small farmers, through co-operative marketing, is a process of competence building and raising the stock of knowledge for small farmers' enhanced capabilities and searching for opportunities to enter competitive markets and address environmental threats.

- An overview of LULUCF and climate change mitigation

The growing levels of carbon dioxide (CO<sub>2</sub>) and other GHGs in the atmosphere are now directly and unequivocally linked to the global climate changes. There are both natural and anthropogenic sources of GHG emissions, one of them being the conversion of natural forests and woodlands into crop land. The emissions caused by changes in land use are equivalent to 17% of the total global emissions and LULUCF is the second largest source of emissions after emissions from fossil fuels and industry.

In this study, Urambo District in Tabora Region and Moshi District in Kilimanjaro Region were involved. In Urambo District the study was focusing on miombo woodlands where shifting cultivation, which involves clearing land for tobacco growing is the major farming system that exerts pressure on the forests. In Moshi District because the focus was on evergreen Montane Forests on a volcanic mountain combined with agro-economic systems, mainly comprising of agroforestry on the slopes of the tallest mountain in Africa at 5895 metres above sea level.

This study looked on how co-operative actions on agro-ecosystems have contributed to GHG emissions and enhancement of carbon sinks. Only 16 villages were selected; eight villages from each district: Kifuni, Umbwesinde, Njari, Mfuni, Kanango, Iwa, Kinyanvua, and Maring'a from Moshi district and Motomoto, Nkokoto, Muungano, Kalemela A, Nsenda, Itebulanda, Songambele and Jionee Mwenyewe from Urambo District. The two districts selected have active agricultural marketing service co-operatives.

Primary co-operatives were the target population, three sample were used; the first sample represented administrative wards; eight wards were selected four wards from each district. The second sample represented the co-operative organizations, and the third sample represented the heads of households (384) in the villages in which co-operatives operated. The data collection tools included;

- Questionnaires
- Interviews
- Documentary reviews
- Participant Observation

- Focus group discussion

Quantitative and qualitative methods of data analysis were employed. In remote sensing, the study used Landsat TM (1995/2005) and ETM (2010/2015) to examine changes in land use/cover types. The images were freely downloaded, processed and analysed by visual interpretation for land use change classification through a screen digitizing. The main criteria for choosing images were availability, avoiding the peak of rain season (March/April) and avoiding images with cloud cover above 20%.

Quantitative survey data were subjected to descriptive statistics where measures of central tendency particularly mean, frequencies and percentages were computed. A logistic regression model was used to assess factors affecting chances of influencing land use change in the study area. The study sought the aid of Statistical Package for Social Sciences (SPSS) version 20 to analyse survey data. The qualitative data were interpreted using content and context analysis techniques.

## Results

- The study showed that intensive farming, establishment of woodlots, use of energy efficient stoves, agroforestry practices, tree planting, and conservation of natural forests were important drivers of land use and land use changes.
- Co-operative actions were significantly linked to carbon emissions and carbon removals through LULUCF. This was through marketing of agricultural products, supply of agricultural inputs, provision of agro-credits and extension services, promotion of agroforestry practices and supply of improved seeds. Quantitatively co-operatives' actions contributed significantly to 76% of the existing carbon stock per hectare in agroforestry systems and 31% of the total carbon stocks per hectare in the miombo woodlands.
- Further it was indicated that farmers through cooperatives' activities generate tradable carbon credits, a commodity that can be traded through co-operatives.
- Co-operative business model offers a framework for smallholder farmers to come together as a strong entity to gain collective bargaining power to achieve benefits in terms of creating avenues for marketing carbon credits generated through activities with co-operative actions.

## Recommendations

- Vigorous knowledge on co-operatives' agricultural practices that reduce emissions and enhance carbon stocks through training and environmental/climate change extension services by different stakeholders
- Efforts to mitigate climate change through LULUCF sector should be built on co-operatives' activities
- It was further recommended that co-operatives need additional support to effectively engage in carbon trading in terms of technical expertise and calls for awareness creation for smallholder farmers to recognize new opportunities in carbon trade.