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Abstract

Purpose: The study examined the contribution of REDD+ in addressing deforestation, climate variability and people's livelihoods in three villages of Ilagala, Karago and Kirando, within the REDD+ Masito-Ugalla ecosystem in Uvinza District, Tanzania.

Methodology: The methods used were household interviews, semi-structured interview, focus group discussions, field observations, analysis of meteorological data, as well as remote sensing and geographical information systems (GIS). A total of 101 households were randomly selected for the study.

Results: The trend of the mean annual rainfall and rainfall deviations from the annual mean revealed the presence of climate variability. Majority of the respondents agreed that climate variability was happening in their area. Deforestation and forest degradation were also a problem in the area as evidenced by expansion of cultivation at the expense of other vegetation types and opening up of the closed woodlands. The findings further revealed that majority of respondents were aware about REDD+ objectives and that the project had provided conservation education to local communities and supported them to alleviate poverty through establishing entrepreneurship groups within the project area, each group dealing with a specific activity, including beekeeping and poultry. Majority of the respondents said they were able to support the education needs of their children as benefits accrued to them during REDD+ operation. The contribution of REDD+ project in minimizing deforestation, climate variability and improving people's livelihoods was manifested through training of forest monitors and fire breakers and establishment of community projects. The REDD+ performance, however, was reported to be on average. Also due to its short operation period, REDD+ did not significantly contribute to people's livelihoods.

Unique contribution to theory, practice and policy: This study has provided important lessons on the importance and opportunities offered by REDD+ in addressing forest

conservation and providing livelihood benefits to the local communities. Although REDD+ policies and projects are geared towards addressing climate change mitigation, if well designed, they can go a long way in alleviating poverty while at the same time conserving the forests. What is required is for nations to identify what the needs of the local communities and the desired benefits in the respective areas are and build into the REDD+ projects strategies that would adequately address those needs and provide the required benefits.

Keywords: *REDD+, deforestation, climate variability, livelihoods, poverty alleviation*

1.0 INTRODUCTION

1.1 Background of the Study

The increase in global climate change impacts demands for climate change mitigations in order to reduce its negative impacts. Hence, at the end of 2007, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) confirmed their commitment to address the global climate challenge through the Bali Action Plan and the Bali Road Map (Angelsen *et al.*, 2009). Their agreement included reference to Reduced Emissions from Deforestation and Degradation (REDD), which specifically called for "policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation; sustainable management of forests and enhancement of forest carbon stocks in developing countries" (Angelsen *et al.*, 2009:1). REDD+ has its origin from the Kyoto Protocol (KP) to the United Nations Framework Convention on Climate Change (UNFCCC). According to Springate-Baginski & Wollenberg (2010) and URT (2013), the Kyoto Protocol to the UNFCCC was adopted in 1997 during the 3rd Conference of the Parties (COP 3), in Kyoto Japan and it entered into force in 2005.

Reduction of emissions from avoided deforestation in developing countries was not included as an appropriate mitigation strategy of the KP. The Centre for International Forestry Research - CIFOR (2009) reveals that the rules on how the mitigation targets described in the Kyoto Protocol had to be accomplished were discussed in 2001 during the Marrakesh Accord (COP 7), in Marrakesh city, Morocco. Accordingly, the Marrakesh Accord stated the role of forests in the Clean Development Mechanism (CDM), but only afforestation (land unforested 50 years ago) or reforestation (land unforested before 1990) was considered, excluding avoided deforestation and sustainable forest management. A formal proposal concerning a mechanism for considering the reduction of emissions emanating from tropical deforestation (i.e. reducing emissions from avoided deforestation) as a climate change mitigation measure was submitted for the first time to the United Nations Framework Convention on Climate Change (UNFCCC) negotiations at COP 11 in Montreal Canada in 2005 (REDD+ Costa Rica, 2015). The proposal was a result of the Stern Report by the Coalition of Rainforest Nations, led by Costa Rica and Papua New Guinea (REDD+ Costa Rica, 2015). Thereafter, forest degradation or the shifts to lower carbon stock densities within the forest was included,

and was later followed by inclusion of restocking within and towards the forest, hence REDD+ (Minang *et al*., 2009).

Tanzania developed the National REDD+ Strategy in 2013 and Action plan to direct implementation of REDD+ activities in the country (URT, 2013). Following this strategy, 9 REDD+ pilot projects have been implemented, (Kajembe *et al.,* 2013; TNRF, 2011). Building REDD Readiness in the Masito-Ugalla Ecosystem Pilot Area in Support of Tanzania's National REDD Strategy, commonly known as the JGI REDD+ project is one of such pilot projects that has been implemented. This project operated in western Tanzania within the Masito-Ugalla ecosystem (MUE). According to the REDD DESK (2013;2012) the project area covered 15 villages in Mpanda and Uvinza districts (previously Kigoma District); however, only seven (7) out of fifteen (15) villages participated in the pilot project. Such villages were: Ilagala, Karago, Songambele, Sunuka, Kirando, Lyabusende and Sigunga, located along the Lake Tanganyika shoreline within Uvinza District. The project was concerned with the protection of about 70,000 hectares of native forest currently classified as "general lands" (open access land), where forest resources are not managed or protected under any legal framework (REDD DESK, 2012). According to JGI (2010), the forests are important watershed catchment for Lake Tanganyika. The REDD Desk (2013) revealed that the project commenced in January 2010 and phased out in December 2012. The financing institution was the Ministry of Foreign Affairs of Norway for a three year period. The total cost of the project was US $ 2,759,641.

According to the JGI (2010) and CIFOR (2014), the project successfully created a community-based organization (CBO), which is an inter-village forest management organization popularly known as "Jumuiya ya Watunza Msitu wa Masito" (JUWAMMA). The CBO was established by the seven villages in 2010. The project also developed a forest management plan with regulations on resource extraction, and supported JUWAMMA in obtaining management rights of the Masito-Ugalla forest area from the district authorities of Kigoma rural and Uvinza JGI (2010) and REDD DESK (2013). According to the REDD Desk (2014), establishment of the JUWAMMA CBO was intended for the management of land and forest resources by local communities under the framework of Participatory Forest Management (PFM).

REDD+ initiatives have played important roles in biodiversity conservation and poverty alleviation. The Energy & Resources Institute (2009), for example, has revealed that the REDD+ regime has enhanced the carbon and other ecosystem services, it has strengthened the efforts of biodiversity conservation, and helped secure the livelihoods of the ecosystem dependent local communities in India. If REDD+ is implemented in a more holistic way and integrated with other development programmes, there would be great scope for improvement of livelihoods of the forest dependent communities. Accordingly, REDD+ can represent a pro-poor shift in the forestry sector as it opens an opportunity for communities to be compensated for protecting and managing the forests. Also REDD+ is integrated with sectoral development strategies such as community-based natural resources management, micro-finance, and local government, thus communities are likely to benefit greatly from it.

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The mechanism offers a scope for tenure security and ensures rights of communities over resources (Energy & Resources Institute, 2009).

1.2 Research Objectives

The objective of this study was to determine the contribution of the REDD+ pilot project in addressing deforestation, climate variability and people's livelihood. Specifically, the study sought to assess the level of community awareness of the REDD+ project, examine the extent of deforestation and climate variability in the study area, identify conservation activities implemented and determine livelihood benefits obtained from the project.

2.0 RESEARCH METHODOLOGY

2.1 Description of the Study Area

This research was conducted in Ilagala, Karago and Kirando villages within JGI REDD+ project area in Masito-Ugalla Ecosystem (MUE). MUE is an expansive forested landscape of approximately 10,827 km^2 under varied management and ownership regimes (Deloitte, 2012). It is located near the western edge of the East African Rift Valley and Lake Tanganyika, in Western Tanzania (Figure 1) (Svoboda & McNamara, 2009) between grid reference 130000 E and 310000 E and between 9350000 N and 9440000 N. REDD+ project specifically operated in six villages located in Uvinza District, along Lake Tanganyika shoreline except Songambele village, which is located a bit in the eastern part from Lake Tanganyika. Only three villages were, however, selected for the study because biological resources in these villages were highly threatened due to over-utilization compared to the rest of the villages.

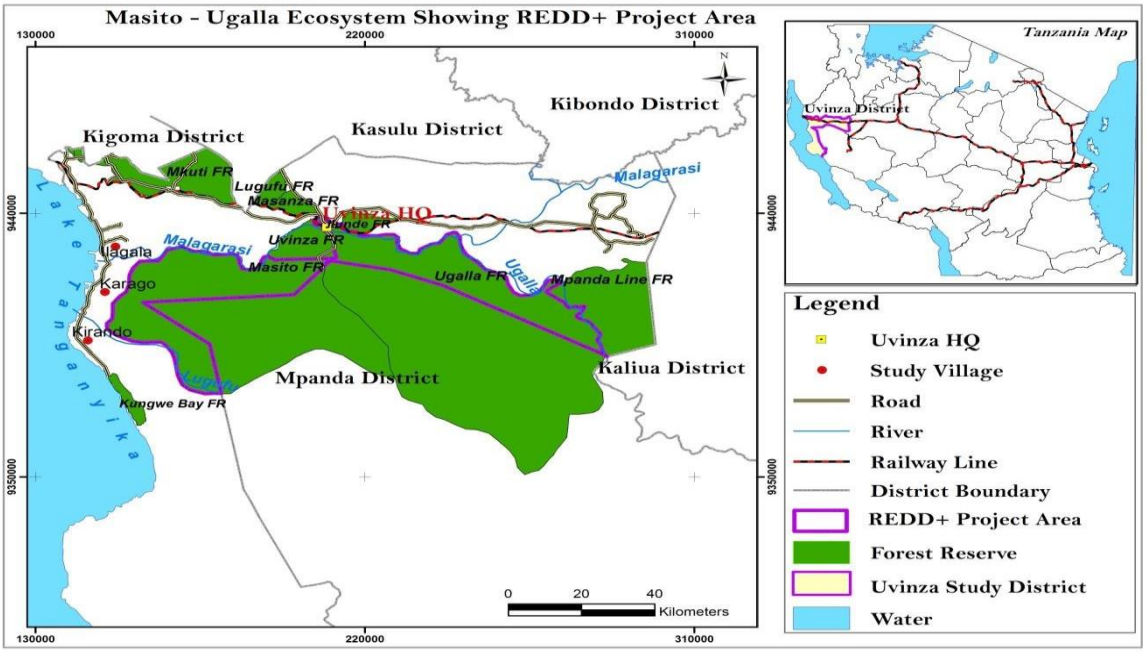

Figure 1: Location of Masito-Ugalla ecosystem and the study villages

Source: IRA Lab, University of Dar es Salaam (2014)

The Masito-Ugalla ecosystem is characterized by seasonal tropical climate with a distinct long wet season beginning from late October to May and a short dry spell of 2-3 weeks in January or February followed by a prolonged dry season (URT, 1998; Svoboda & McNamara, 2009). According to URT (1998), annual rainfall varies from 600 mm – 1500 mm, being intense in the highlands, intermediate in lower slopes and low in valley bottom and lake-offshore areas. The mean maximum temperatures of between 21^0C and 30^0C and mean minimum temperatures of between 15^0C and 21^0C were being experienced within the larger eco-region (Svoboda & McNamara, 2009). MUE is a dry Miombo woodland area dominated by *Isoberlinia, Julbernadia* and *Brachystegia* species, with *Brachystegia bussei* often found on the steep slopes of the eroded canyons (Moyer *et al.*, 2006).

Majority of the respondents (71.3%) in the study area were involved in agriculture. The major food crops included maize, paddy, cassava, bananas, beans and sorghum while cash crops were commonly oil palm and groundnuts. Some respondents were also engaged in business, especially in small scale industries for soap making, palm oil and palm kernel oil extraction and printing (URT, 1998). A few were employed while others were engaged in other economic sectors such as fishing, which is conducted in Lake Tanganyika and Malagarasi River. Other socio-economic activities such as livestock keeping involved few people (4%) in the study area. A large number of men, especially in Ilagala village, were also involved in fetching water from Malagarasi River using bicycles and selling it to other villagers. Only a small proportion of females were seen running small businesses such as food vending, popularly known as "Mama Lishe". Some few females were working with males in local palm oil processing industries.

2.2 Sample Size and Sampling Procedures

The sample size was drawn at 90% confidence interval corresponding to a level of significance α. With such level of significance, the margin of error (E) or the probability of committing an error was therefore ± 0.1 (Smith, 2013). Households were used for drawing the sample. The sample (n) was drawn from a list of households, which were obtained from Kigoma Regional Commissioner's Office. The total number of households (N) in the three villages was 11,632. This study was conducted without knowing the population's behaviour, (i.e. it was not possible to quantify the population standard deviation), therefore, the Slovin's formula (Word Press, 2014) was adopted for obtaining the sample size, such that: $n = N/(1+Ne^2)$, where "n" is the sample size, "N" is the total population (for this case, the households) and "e" is the error tolerance or margin of error. Therefore, 99 households were considered as the sample size for this study.

In every household only one adult respondent was picked as a respondent. The actual population was not preferred due to the fact that it included people of different ages, even those aged below 18 years, which was the lower limit of the respondent's age. Two more respondents were included above the calculated sample size, giving a total of 101 respondents due to easy availability of extra respondents before accomplishment of the questionnaire

survey exercise. Thus every household which was accessed was picked and included in the sample population.

2.3 Data Collection Methods

Different data collection methods and techniques were employed. Such methods were household interviews, semi-structured interview, focus group discussion, direct observation, remote sensing and GIS as well as analysis of climatic data. The use of different methods during data collection allows verification of the results and identification of new ways of capturing a problem to balance with usual data collection methods (Jick, 1979). In addition, the various results obtained from a combination of these methods can also lead to an improved rationalization of the research problem.

2.3.1 Household Interviews

Household interviews were conducted using a structured questionnaire, which consisted of both open and closed-ended questions. Before data collection, questionnaire pretesting was conducted in the study area. A pre-test was necessary to determine how the questionnaire could be improved to minimize response errors, such as a respondent misinterpreting a question (Bolton, 1993). Types of data, which were collected using this method, included demographic data and socio-economic characteristic of households, people's awareness of the REDD+ initiative, perceptions of respondents on the extent of climate variability, extent of deforestation, forest degradation, the contribution of REDD+ to biodiversity conservation and people's livelihoods.

2.3.2 Semi-Structured Interviews

Semi-structured interviews were used to gather qualitative data from key informants. In this study, the key informants comprised of Village Chairpersons, Village Executive Officers, Ward Executive Officers; one "JUWAMMA" leader, forest monitors responsible for conducting field patrols, fire breakers responsible for controlling wildfires and a District Natural Resources Officer (DNRO). There were eight (8) key informants from whom information was obtained. Key informants were asked pre-determined questions and then allowed to respond. Diverse types of data were collected using this method, such as people's awareness on REDD+ project, extent of climate variability, REDD+ conservation activities for addressing deforestation and climate variability and poverty alleviation. Other data were; performance and success of REDD+ in addressing deforestation and people's livelihoods and benefits obtained from the project.

2.3.3 Focus Group Discussions (FGDS)

Focus group discussions were also used to collect qualitative data. The FGDs involved two processes, which were brainstorming and discussions. According to Pripathy and Pripathy (2017), in a focus group discussion, a small number of individuals (e.g. 8-12) are brought together to talk about some topic of interest to a focus group moderator. There were four focus groups comprising 10 individuals each. The first group included farmers; the second

one represented women as the major forest resource users; the third group consisted of businessmen; and the last focus group represented honey gatherers. The types of data which were collected using the FGD method included; people's awareness on REDD+ project, extent of climate variability, and REDD+ conservation activities for addressing deforestation, climate variability and Poverty. Other data were REDD+ performance and its success in addressing deforestation and climate variability, and people's livelihoods and benefits obtained from the project.

2.3.4 Observation

In this study, unstructured observation (Mulhall, 2003) was used to gather variety of data such as socio-economic activities e.g. logging/lumbering, indicators and impacts of climate variability, availability of biological resources, water resource and human life. Visits were made to different locations in the study area, such as village forest lands, Masito forest and villages within the study area to observe socio-economic activities and development. Photographs were taken in the Masito-Ugalla ecosystem to reveal the status of deforestation and forest degradation. Dwelling houses were also photographed to illustrate the poverty situation of the villagers. Photographs were also taken to present socio-economic activities such as beekeeping as well as presence of social development ventures such as construction of village offices supported by REDD+ project.

2.3.5 Remote sensing and GIS

Assessment of the extent of deforestation and forest degradation was based on the interpretation of satellite imageries and use of Geographical Information Systems (GIS) to determine changes in land use and land cover between 1990 and 2014. Landsat Thematic Mapper ™ for 1990 and Landsat Enhanced Thematic Mapper Plus (ETM+) for 2000 and 2014 were used to extract spatial and temporal land cover and use data. Initially, the intention was to detect land cover changes for every 10 years, from 1990 to 2010. However, because the REDD+ pilot project was implemented from January 2010 to December 2012, it was found necessary to include this period in order to investigate the effectiveness of the REDD+ project in addressing deforestation. Further details on this method are found in Makunga & Misana (2017).

2.3.6 Meteorological data

Rainfall data for Kigoma region covering the period 1999 to 2013 were collected from the Tanzania Meteorological Agency. The data were used to assess the extent of climate variability in the study area.

2.4 Data Analysis

Both quantitative and qualitative data analysis approaches were used in the analysis of the collected data to allow easy interpretation of numerical and respondents' perceptions, respectively. Quantitative data analysis was accomplished using IBM Statistical Package for Social Sciences (SPSS), version 20.0. Qualitative data, which involved those obtained using

FGDs and semi-structured interviews, were analyzed using the content analysis (GAO, 1989; Stewart and Shamdasani (2017). Under the content analysis, materials to be analyzed were first determined. The next step involved categorization of the recorded units into several themes falling under the study objectives. Qualitative data collected using questionnaires were intended to generate outputs in terms of frequencies and percentages, which revealed perceptions of the respondents on particular matters.

Remote sensing data were analysed using ArcGIS V10.1 to identify changes in land cover (Makunga & Misana, 2017). A change detection matrix was generated for easy identification of the changes. Meteorological data on the other hand were analysed using Microsoft Excel Program. The mean annual rainfall was calculated from the monthly rainfall data for the 15 year period (1999 to 2013). Mean of the mean was then obtained from individual mean annual rainfall data, from which the deviation from the mean annual rainfall was calculated.

3.0 RESULTS AND DISCUSSION

The objective of this paper is to present and discuss findings with the intention of identifying the contribution of JGI REDD + Project in addressing deforestation, climate variability and people's livelihoods in Western Tanzania.

3.1 Extent of Climate Variability

Climate variability was found to be a problem in the study area. Basically, curbing climate change/ variability impacts through conserving natural forests was the principal objective of REDD+. Fluctuations in the mean annual rainfall were common in Kigoma Region with the highest peak experienced in 2006 (Figure 2 and 3). A significant decrease in rainfall was experienced in the year 2005 and 2012. There were nine years that had experienced low amounts of rainfall below the annual mean between 1999 and 2013 (Figure 3). The trend of the mean annual rainfall and rainfall deviations from the annual mean presented in Figure 2 and 3 clearly reveal the presence of climate variability in the study area. The observed variation from the mean annual rainfall was, however, small as revealed by the coefficient of determination (R^2 = 1.8%). These findings were supported by majority of the respondents (86.1%) who agreed that climate variability was happening in their area. Only 13.9% said they had never experienced climate variability. This could probably be due to the fact that they had not yet been impacted by climate variability.

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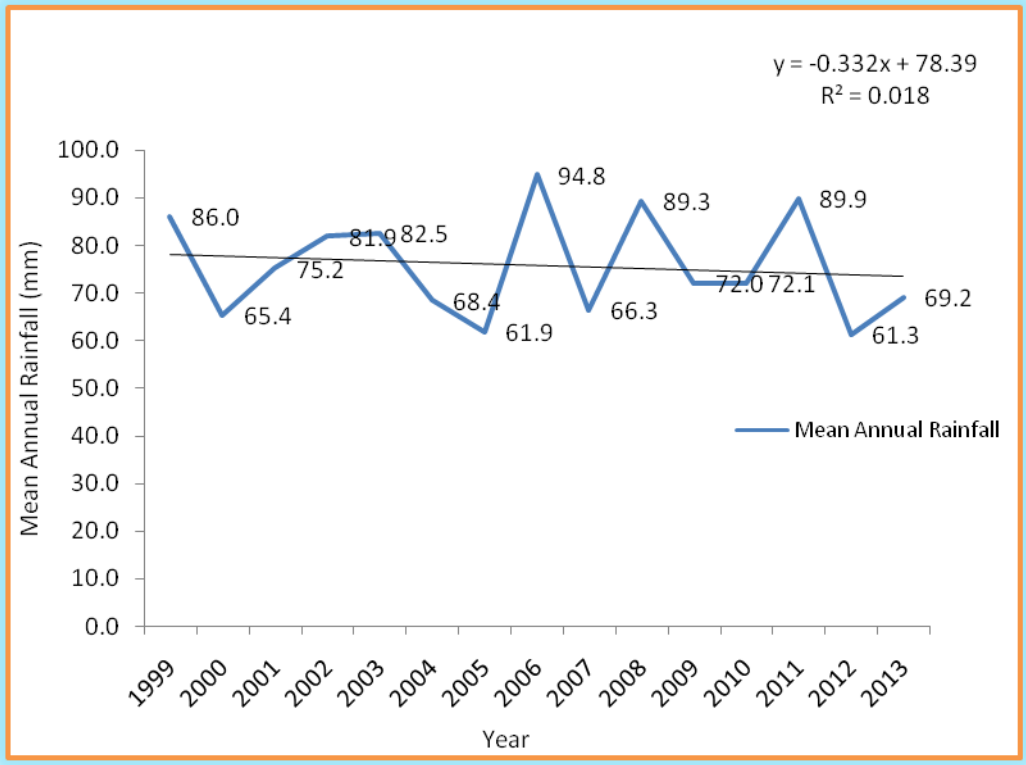

Figure 2: Mean annual rainfall (mm) in Kigoma Region (1999 – 2013)
Source: Tanzania Meteorological Agency - TMA (2014)

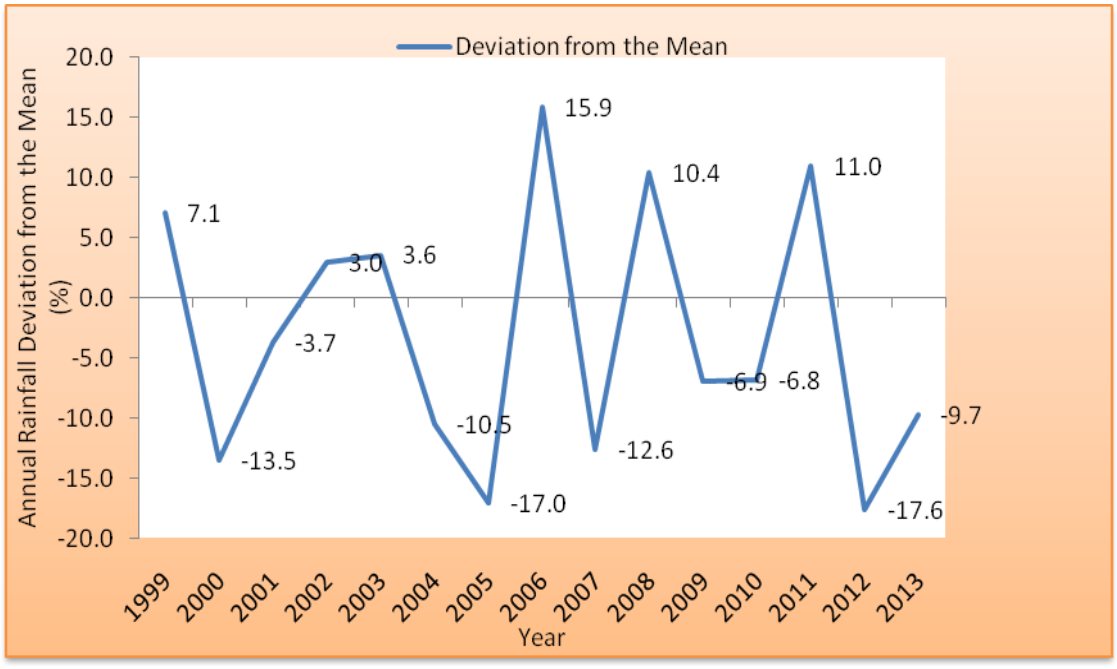

Figure 3: Annual rainfall deviations from the mean (75.7mm) for Kigoma Region, Tanzania (1999 – 2013)

Source: Tanzania Meteorological Agency - TMA (2014)

3.2 Extent of deforestation in the Masito-Ugalla Ecosystem

The results on the extent of deforestation and forest degradation are presented in detail by Makunga & Misana (2017). These results provide evidence for woodland degradation and deforestation illustrated by opening up of dense woodlands and replacement of woodlands, bush lands, thickets and grassland by cultivated lands, respectively. Results from analysis of satellite images showed that closed woodland declined by 11.1% between 1990 and 2000, and by 2014, it had diminished to only 5.6% from 23.2% in 1990. A similar pattern of decline was observed in other types of vegetation such as dense bush land, bushed grassland and forest. On the other hand open woodland and cultivated land showed an increase between 1990 and 2014, with the latter having increased from 2.23% in 1990 to 17.1 in 2014. Open woodland had increased by 14.7% during the same time period. These results clearly indicate the extent of deforestation and woodland degradation, which have been mostly associated with anthropogenic activities. These results were supported by questionnaire data and data from key informants and focus group discussions. They were also in line with findings from Svoboda & McNamara (2009).

3.3 People's Awareness on REDD+ Project

The study indicated that the large majority of the respondents (90.1%) were aware about REDD+ conservation activities for addressing climate variability, avoided deforestation and forest degradation as well improving people's livelihoods. Very few (9.9%) had no idea. Majority of the respondents (73.3%) also reported that the main objective of REDD+ was provision of conservation education. Few respondents reported on other objectives such as forest protection (2%); forest protection and provision of conservation education (4%); addressing good governance (4%); and strategies for poverty alleviation (6.9%).

In meeting its objectives, respondents reported that REDD+ project used a variety of awareness strategies. The large majority (88.9%) reported that village meetings were the main awareness strategy used by REDD+. Other strategies were reported by very few respondents, such as seminars or training (8.1%), radio programmes (2.0%) and television (1.0%). One key informant at Karago village revealed that village meetings were the common awareness strategy in rural areas because majority of the villagers lacked access to television. He said that even other media of communication such as radio were not largely successful due to the fact that majority of the people in the area engaged in farming activities, such that REDD+ information could not be delivered appropriately. "This makes village meetings the most suitable means of communication", he said.

Supporting the above findings, the Nordic Agency for Development and Ecology - NORDECO (2013) revealed that a more important REDD+ activity in Tanzania has been investing in the awareness campaigns using different media and strategies and different levels. Important new media tools were being used and opportunities to reach out to decision makers and broader public had been taken.

3.4 REDD+ Conservation Activities for Addressing Deforestation, Climate Variability and Poverty Alleviation

Forest monitoring (Table 1) was reported by majority of the respondents (64.4%) as a conservation activity, undertaken by REDD+ in addressing deforestation and climate variability in the study area. Supporting income generating activities, establishing CBOs, benefit sharing plan, sustainable local hunting, and provision of conservation education were reported by very few respondents. During its three years of operation, REDD+ was mainly involved in educating the community about conservation matters. Conservation groups such as forest monitors and fire breakers were established and supported during the pilot REDD+ project. Forest monitors were selected from every village within the project area for conducting field patrols in the Masito-Ugalla ecosystem. These monitors mobilized other villagers to engage in forest monitoring to avoid deforestation.

Such forest monitors received field training from Pasiansi Wildlife Training Institute, in Mwanza Region (Deloitte, 2012) on how to conduct field patrols as a measure to protect biological resources against illegal uses. Also fire breakers were trained on how to fight against wildfires. The knowledge and skills were shared among other villagers. Indufor (2014) reported that the project engaged in a number of activities such as formation of inter-village forest conservation organization known as JUWAMMA. Another activity was a replicable methodology for remote sensing/GIS based forest and carbon accounting. Indufor (2014) also mentioned such other activities as empowerment of local trainers comprised of stakeholders that facilitated broad stakeholder participation in REDD+ project design and management; provision of communities and CBOs with the tools and skills to monitor forest biomass and carbon stocks as well as development and practice of community based equitable benefit sharing mechanism.

Table 1: REDD+ conservation activities for addressing deforestation, climate variability and poverty alleviation (N = 101)

Conservation Activities	Frequency	Percent (%)
Forest Monitoring	6	64.4
Supporting Income Generating Activities	4	4.0
Establishing CBOs	4	4.0
Effective Benefit Sharing Plan	3	3.0
Sustainable Local Hunting	1	1.0
Providing Conservation Education	9	9.8
Other Activity such as Forest Protection	5	5.0
No response	10	9.9
Total	101	100.0

Source: Field Data (2014)

It was also revealed by key informants and one of the focus groups that REDD+ had assisted villagers to establish more than 10 entrepreneurship groups within the project area, each group dealing with a specific activity. Such activities were beekeeping (Plate 1) and poultry, aiming at poverty alleviation, thus reducing dependence on forest resource. One member of the FGD explained that in June 2014, their group popularly known as "Mategemeo" at Ilagala village, managed to collect 80 litres of honey from 35 bee hives and sold them at TZS 560,000/= (i.e. 334.97 US $).

Plate 1: Beehives located at Mahanga forest, Ilagala village

Similar scholarly views by Skutsch & McCall (2012) and Terre (2013) have supported the above findings. Skutsch & McCall (2012), for example, observed that communities might be involved in reducing deforestation through creation of large-scale community-owned reserves in areas where there is low population density. In Madagascar, Terre (2013) reported that World Wildlife Fund (WWF) recruited around 50 people for the project to work towards reinforcing a number of initiatives, including: the creation of protected areas, raising public awareness on climate change, the reduction of deforestation by promoting and encouraging alternatives to slash and burn agriculture, the transfer of forest and natural resources management and the restoration of degraded forest landscapes. Terre (2013) further revealed that their programme had already contributed to raising awareness of 34,000 households regarding sustainable alternatives to slash and burn cultivation practices; restoring 23,000 hectares of fragmented forest; reforesting 2,200 hectares of land for energy and construction wood, to supporting local population needs. Other activities according to Terre (2013) were creation of 470,000 hectares of new protected areas, in order to conserve forests and biodiversity; and estimate precisely the CO_2 emission reduction potential.

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3.5 Benefits Accrued to Individual Persons during REDD+ Project

Implementation of JGI REDD+ project generated a number of benefits to the people in the study area through various activities, which it supported. Such benefits were employment, supporting education needs of school children, affording medical and health care and gaining knowledge and skills through engaging in entrepreneurship activities. Majority of the respondents said they were able to support the education needs of their children (Figure 4). Employment, medical and health care support as well as capacity building in conservation entrepreneurship were mentioned by few respondents.

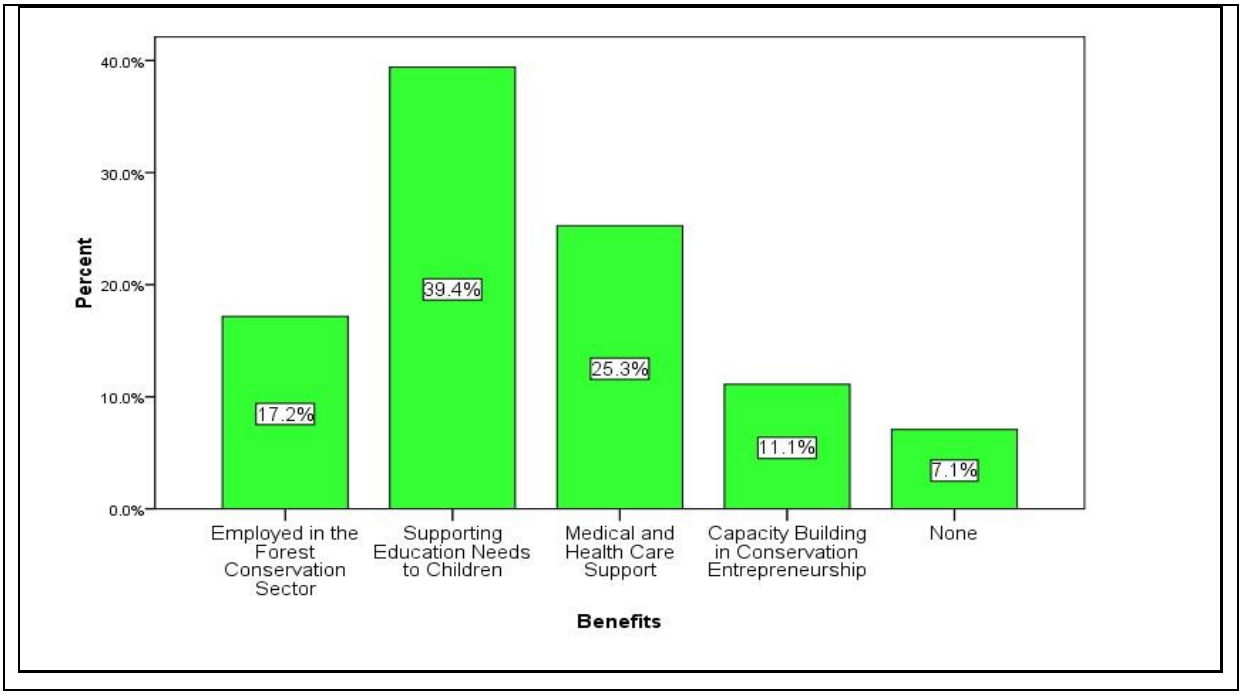

Figure 4: Benefits accrued to respondents from REDD+ project (N = 101)

Source: Field Data (2014)

Studies by Hvalkof (2013) and Peskett (2010) have supported the above findings. Hvalkof (2013), for example, mentioned the social benefits emanating from REDD+ projects as being maintaining sustainable livelihoods, cultures and communities; cultural services and traditional knowledge resources; adding social value to forests; food security and dynamic subsistence economy and income generation and employment. Peskett (2010) added other benefits, which included carbon revenues for eligible beneficiaries, employment in REDD+ activities for individuals and formalized (but limited) access to natural forest on plantation. Findings by Lawlor *et al*. (2013) on the other hand revealed that tree-planting and Payment for Ecosystem Services (PES) projects tended to produce higher opportunity, and benefits, in terms of jobs and income. According to them, REDD+ offered the best opportunity for income-generation given the lack of available alternatives in many African countries. All these findings are in line with the observations of UNEP (2014) who reported that even though the primary goal of REDD+ policies was to support climate change mitigation, goals could also cover additional benefits to people and the environment. Thus identifying the desired benefits of REDD+ policies could help in evaluating whether the interventions being considered were sufficient for achieving them.

3.6 The Performance and Success of REDD+ in Addressing Deforestation, Climate Variability and People's Livelihoods

Majority of the respondents (51%) reported that REDD+ had attained good performance in terms of minimizing deforestation, climate variability and poverty while 48% said that the performance was not good. Only 1% of the respondents were not sure. When asked about areas of REDD+ success in addressing climate variability, avoided deforestation and forest degradation as well as improving people's livelihoods, majority of the respondents (42.6%) reported about construction of government buildings such as classrooms and village offices (Plate 2) as a means of making people appreciate the role of conservation initiatives in minimizing climate variability. According to key informants, social developments, such as construction of village offices, which were supported by REDD+ project were funded through allocation of a total of 320 million (TZS) as an incentive for effective conservation of Masito forest. Supporting education needs in the study area was also seen as important in building a future generation of children with sufficient knowledge and skills in supporting the environment against climate variability. Other areas of success mentioned were improved conservation education (33.7%) and improved people's income through entrepreneurship groups (23.8%).

Plate 2: A new village office at Songambele village constructed under support of REDD+ project

The awareness raising activities were also found to have been well implemented and were contributing to improved awareness of REDD+ and related climate change issues. The UN-REDD Programme (2010), also supported that its website would continue to raise awareness of REDD+ issues and developments, and provide a platform to share news and information about the programme's activities with a broad range of target audiences, including the general public.

Reporting on REDD+ success, majority of the respondents (43.9%) ranked REDD+ as good in attaining conservation objectives while 40.8% of the respondents reported that the level of attainment was very good. Very few 7.1%) reported that it was excellent, fair (5.1%) and poor (3.1%). It was reported by some key informants that the education and establishment of conservation groups increased the number of forest patrols, thereby reducing frequencies of illegal human practices such as deforestation. This was important in protection of Masito-Ugalla ecosystem. The capability of the people to manage natural resources, however, was to some extent inhibited by the shorter period (three years) of REDD+ operation in the study area, such that changing people's perceptions and behaviour towards conservation matters was not likely to be effective.

One of the focus groups reported that REDD+ project was successful in building the capacity of local communities through conservation entrepreneurship enterprises within the three year period of its operation. Community projects, beekeeping and poultry, which were supported by REDD+, however, did not make villagers less dependent on natural resources due to high rates of poverty observed in the study area. Such shortcoming of the JGI REDD+ project also affected the people's assets in terms of, for example, financial resource, which could help many people recover from stress and shock caused by the existing climate variability. Some key informants said that because of the short operation of the project, there was an alarming

danger that after phasing out of the REDD+ project, people might have gone back into the forests where they expected to obtain their livelihoods, thus exacerbating forest degradation. They expressed their worry that if no other projects with similar objectives like REDD+ will be implemented in their area in the near future, the probability of worsening forest resources will be much higher than it was before, thus fostering climate change.

The results, however, revealed that due to its short operation period, REDD+ did not significantly contribute to people's livelihoods. Despite the existing social developments, income poverty in the study area was found to be a major constraint in attaining forest conservation goals as well as improving human livelihoods. Majority of the villagers in the study area were observed to live in low standard houses (Plate 3). It was reported by respondents that although REDD+ project had improved community awareness in conservation of natural resources within the MUE, people's living standard was still very low. The short duration of REDD+ operation was mentioned by respondents as a shortcoming that hampered the efforts aimed at improving livelihoods of the villagers.

Plate 3: A low standard dwelling house at Ilagala village

Studies by Mori (2013); Wildlife Works (2008); Climate Care (2015) and UNEP (2015) have supported the above findings. Mori (2013), for example, reported that some REDD+ projects, such as Kasigau Corridor REDD Project (Phase I–Rukinga Sanctuary) in the Coast Province of Kenya, Sofala Community Carbon Project, in Mozambique and Rimba Raya Biodiversity Reserve REDD Project in Indonesia, which had longer operation period, had higher opportunity of improving the capability of people in their respective areas in relation to natural resources conservation. A good example is the Kasigau REDD+ project, which is

reported to have supported the livelihoods of 1.6 billion people, and directly supported more than 100,000 people among the local communities (Climate Care, 2015). It also provided money for local communities to implement projects of their choice such as water provision and bursaries for education. A community trust fund, which was established during implementation of the project, invested in local projects, including a water catchment project that provided water for up to 8000 people on a weekly basis (The Climate care, 2015). Over 2000 children were also funded into secondary school and tertiary education and 20 classrooms were built or renovated.

More or less similar results have been reported in Zambia where, according to UNEP (2015), the basic REDD mechanism, together with its enhanced version, REDD+, had played a significant role in catalyzing the transition to a green economy. Forests are estimated to have provided over 1 million jobs, supporting more than 60% of rural Zambian households, which were heavily dependent on the use of natural resources to sustain or supplement their livelihoods. According to UNEP (2015), forest resources contribute approximately 20% of household incomes, including the market value of subsistence production. This is different from what was found in our study area where incomes had not improved much. This could be explained by the short duration of the project as already explained.

4.0 CONCLUSION AND SUGGESTIONS

Problems related to climate variability, deforestation and forest degradation as well as poverty were identified in the study area. The trend of the mean annual rainfall and rainfall deviations from the annual mean revealed the presence of climate variability in the study area. REDD+ project used village meetings as the main awareness strategy for raising people's awareness. Also, it provided conservation education to local communities and supported them to alleviate poverty. Among the REDD+ success were its support to villagers in provision of conservation education, assisting them in establishing entrepreneurship groups within the project area with specific activities such as beekeeping and poultry. Thus, some villagers managed to support the education needs of their children. Training of forest monitors and fire breakers and establishment of community projects helped the REDD+ project in addressing deforestation, climate variability and improving people's livelihoods. Nevertheless, the project only registered average performance, with problems of deforestation, climate variability and poverty continuing unabated. REDD+ projects, however, stand on the right track in addressing deforestation, climate variability and poverty challenges not only in the MUE but also in many developing countries. It is, therefore, recommended that conservation education should continue to be delivered among local communities and other stakeholders in order to improve their understanding of conservation and sustainable use of natural resources. Furthermore, the government and other foreign agencies must collaborate with the local people in addressing poverty alleviation through appropriate plans, programmes and strategies to reduce dependence of people on natural resources. This will create a balance between the demand for the available natural resources and conservation of the same, thereby contributing to the mitigation of climate change impacts.

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