ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

CAN REDD+ COMPENSATE ADEQUATELY THE FOREST- DEPENDENT LIVELIHOODS IN TANZANIA? INSIGHTS FROM CHOICE MODEL ANALYSIS IN KILOSA DISTRICT

Agnes Godfrey Mwakaje
Institute of Resource Assessment, University of Dar es Salaam, Tanzania.

Manuscript Info

Manuscript History:

Received: 10 November 2013
Final Accepted: 28 November 2013
Published Online: December 2013

Key words:
REDD+, forest conservation, forest livelihood dependants, sustainable development, Tanzania

Abstract

Tanzania is one of the nine pilot countries for the United Nation's Reducing Emissions from Deforestation and Degradation (REDD+). It has been receiving significant funding from development partners including the World Bank. Under the REDD+, countries on a voluntary basis, aim to reduce the rate of deforestation and receive compensation in proportion to the carbon emissions saved following the intervention. It creates incentives for developing countries to invest in low-carbon paths to sustainable development. The question however is whether REDD+ will compensate adequately the forest-dependent livelihoods. This information is important for sustainable development as poor communities depend on forest goods and services for their livelihoods. A total of 110 households were selected randomly for interviews to determine the preferred incentive package and analyse the REDD+ governance structures. Through Choice Model analysis, the findings showed a high preference by the respondents on sustainable utilisation of forest resources; improved farm productivity and markets access for agricultural commodities. While REDD+ has the potential to address deforestation, it is questionable whether the livelihood aspect as preferred by communities will be achieved due to mainly inefficient governance structures in place. This will undermine the spirit of sustainable development that emphasize on socio-economic and environmental sustainability.

Introduction

Reducing Emissions from Deforestation and forest Degradation (REDD+) and enhancing forest carbon stocks in developing countries has been proposed as a viable option for addressing climate change quickly and at relatively low cost. The proposed mechanism for Reducing Emissions from Deforestation and Degradation (REDD+) offers significant potential for conserving forests to reduce negative impacts of climate change (Burgess *et al* 2010). The REDD+ initiative has emerged as a means through which individuals, projects and communities in developing countries can be financially rewarded for reducing emissions from deforestation, forest degradation and enhancement of carbon stock (Hiraldo and Tanner, 2011).

Tanzania is one of the nine pilot countries for the United Nations REDD Programme. It has been receiving significant funding from the Norwegian, Finnish and German governments and is a participant in the World Bank's Forest Carbon Partnership Facility (Burgess *et al* 2010). Under the REDD+, countries would on a voluntary basis aim to reduce the rate at which their forests are being lost and receive compensation in proportion to the carbon emissions saved compared to a baseline reference scenario which represent the 'without intervention' case (Zahabu *et al* 2008). It is argued that REDD+ has the potential to simultaneously lead to cost-effective climate change mitigation and human development.

However, there is a concern that REDD+ type of agreements designed to reduce carbon emissions from deforestation by restricting access to forests could deprive rural households of a major part of their livelihood (Chhatre and Agrawal, 2010). This argument is partly supported by the fact that the relationship between poverty alleviation and biodiversity conservation has been the subject of intense debate amongst academic and development practitioners for several decades, yet consensus on how to reconcile these two desperate goals is far from being reached (Kepe *et al* 2004). Indeed, the future of world's forests and the future of world's millions poorest people are inextricably interlinked (Scherr *et al* 2003). While REDD+ clearly presents some opportunities for positive social outcomes, but also there are risks of serious negative outcomes (Smith and Scherr, 2003). For example, some of the challenges of REDD+ as identified by Gomes *et al* (2010) include its complexity, lack of technical capacity for implementation, opportunities for participation, benefit sharing, and the traditional system of shifting cultivation. Studies show that large-scale industrial plantations and strict forest protection are economically viable, but pose the highest social risks (Smith and Scherr, 2003).

Forests provide multiple benefits at local to global scales. These include the global public good of carbon sequestration and local and national level contributions to livelihoods for more than half a billion users (Chhatre and Agrawal, 2010). Forest commons are particularly important class which depend on these forests multiple benefits (Chhatre and Agrawal, 2010). The majority of Sub-Saharan Africa's population relies on forest products for subsistence uses, cash income or both (Timko *et al* 2010)**.** Empirical evidence suggests that forests provide one-fifth of household income in rural communities (Levitt, 2011). A study in Ethiopia reveals that forest income contributed 39% of the average household income, roughly equal to agriculture, which contributed 40% (Mamo *et al* 2007). The study established that forest income was more important than all other income sources combined for the poorest 40% of the households interviewed and contributed more to households' income than agriculture for 65% of the respondents (Mamo *et al* 2007). A study undertaken by the Centre for International Forestry Research (CIFOR), found that income derived from forest sources made up between 20% and 25% of the total household income of rural communities (Levitt, 2011). The study further confirms that income derived from forest was not just important for the poorest households, but for the entire forest-dwelling community (Levitt, 2011). According to Mamo *et al* (2007) forest resources have an important income-equalizing potential among the rural households. The authors warn that reduced access to forest resources would greatly affect the welfare of the rural population and increase wealth differentiation among the rural households.

REDD+ AND SUSTAINABLE DEVELOPMENT

REDD+ has the potential to lead to sustainable development but, only if it will address deforestation and enhance socio-economic development of the forest dependent communities. This will depend on how the REDD+ governance structures are developed and managed. In resource dependent rural areas of developing countries, common property resource management has been considered as one of the most viable options for combining poverty reduction, enhancement of local level economic development and biodiversity conservation (Adhikari *et al* 2004). Studies also suggest that mechanisms that focus on enabling the implementation of agreed requirements (locally and internationally) are most likely to deliver positive outcomes for both forests and local stakeholders (Kanowski *et al* 2011) and that community-based forest monitoring can help overcome some of the challenges facing REDD+ (Danielsen *et al* 2011). To avoid negative impacts on local population it is also suggested that social safeguard policies under REDD+ regimes must overcome the significant barriers posed by ambiguous property rights and weak governance (Lawlor *et al* 2010). The author proposes 5 areas of REDD+ governance that could lead to sustainable development:

a) Local community support for project-level activities;
b) Citizen participation in reforms affecting property rights and land use;
c) Transparency of forest carbon revenue flows;
d) Citizen access to grievance mechanisms; and
e) Opportunities for adaptive management through evaluation.

But more importantly, the preferred choices by forest dependent communities must be mainstreamed in the REDD+ governance structures for sustainable development.

The purpose of this study was to find out whether REDD + will compensate adequately the forest dependent livelihoods in rural areas of Tanzania with the case study of Kilosa District. The choice of the District was fourfold. One, it is one of the districts with large area of forest endowment and the degradation is quite high, two, the poverty in the district is perverse and deep; three, the dependency on forest resources for livelihoods is high and four, it is one of the districts under pilot REDD + programmes. While the studies of the importance of forest goods and

services to rural livelihoods have been carried out for decades and the institutional complexities of the conservation-development nexus in the context of forestry have long been examined (Adhikari *et al* 2004; Kanowski *et al* 2011) , little is known on whether REDD+ will compensate adequately the forest dependent livelihoods by considering communities' preferences and choices into its governance structures.

Findings from this study will inform policy makers and international community on how best the REDD+ programmes could address deforestation and forest degradation, but also enhance forest dependent livelihoods. It will also provide a socio-economic profile of the forest dependent communities which could form a baseline for monitoring the impact of REDD+ in the study area in the future.

Objectives of the study

The general objective of the study was to come up with an understanding of the magnitude of forests livelihoods dependency and the likely impact of REDD+ in Tanzania with the Case Study of Kilosa District.

Specific objectives were:

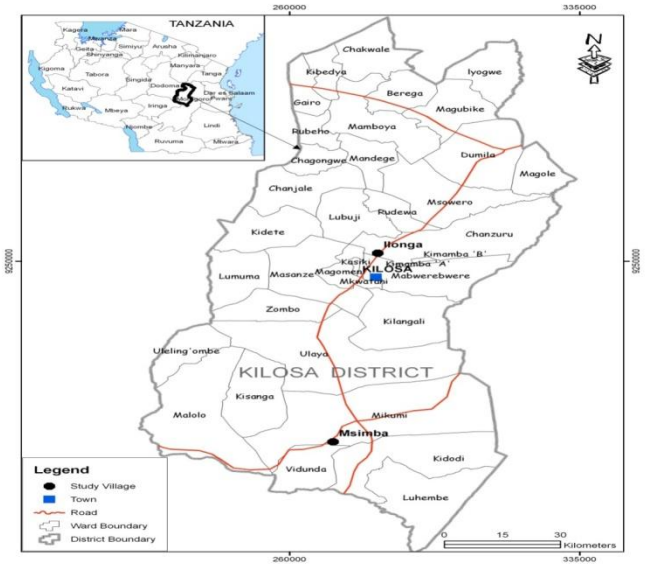
- To investigate the magnitude of forest livelihoods dependency by the communities in Kilosa District;
- To investigate the incentive package that is preferred by the forest dependent communities for incorporation in the REDD+ programmes;
- To investigate REDD+ governance structures and assess whether there is any linkages with the communities choices preferred; and
- To assess whether REDD+ has the potential to address sustainable development.

MATERIAL AND METHODS

The study area

Kilosa District is located in east central Tanzania, 300 km west of Dar es Salaam Region. It is bounded by latitude 5°55' and 7°53' South and longitudes 36°30' and 37°30 east (URT, 2010). The District covers a total area of 1,424,500 ha of which, 536,590 ha are suitable for agriculture, 483,390 ha are under natural pasture and 323,000 ha cover Mikumi National Park. Furthermore, 80,150 ha are under forestry cover while the remaining 14,420 ha are urban areas, water and swamps (URT, 2010). Figure 1 displays a map of the study area in Tanzania.

Figure 1: Location of Kilosa District



Source: Modified after IRA, 2012

According to the National Population and Housing Census of 2012, Kilosa District had 438,175 people of which 218,378 were males and 219,797 females, with an average family size of 4.4 people (URT, 2012). This is slightly lower than the national average of 4.8 people. The growth rate was 2.5% which is relatively low compared to the

national average population growth rate of 2.7% (URT, 2012). The District's population density is 34 persons per square km compared to the national average of 50.85 persons per sq km (WB, 2011).

More than 80% of the District population is engaged in agricultural production activities. Approximately 93% of land used for farming is under subsistence crop production, while 7% is used for cash crop production. The production technology is poor which is dominated by hand hoe, low/or no input use and rainfed agriculture. There are also poor post-harvest techniques. Consequently, the farming sector has not yet contributed much to the District's economy. Poor farming technologies have also been one of the causes for deforestation and shifting cultivation in the district.

The forest resource has been under considerable pressure not only from agricultural activities and livestock grazing but also from extraction of forest products. Forests provide firewood, timber, fruits, medicines, wild vegetables, shade, and material for various tools and fodder for animals (Gausset *et al* 2007). Forests and forest trees are the sources of a variety of foods that supplement and complement what is obtained from agriculture, fuels for cooking, a wide range of medicines and other products that contribute to health and hygiene (Harrison, 2006). Common pool resources are shared by multiple users and support rural livelihoods in diverse ways, providing water, grazing, raw materials for tools and building, fuel, food and marketable goods. These resources also fulfil aesthetic, ritual or spiritual functions within communities (Harrison, 2006*)*. Such resources support 'traditional' livelihoods and offer opportunities to support new economic opportunities, often linked to private sector enterprises, including eco-tourism (Harrison, 2006). Generally, common pool resources often provide a safety net to the poor that helps in reducing risk and vulnerability.

The District has 47 roads network covering 1,429 km, among them 513km are regional roads and 916 are district roads. A high proportion of the rural roads are in poor condition which affects movement of goods from one area to another. However, on the other hand, villages adjacent to the Dar es Salaam-Iringa highway can easily find markets for their products including forest resources (Mwakaje *et al* 2010).

Sampling framework and sample size

In order to carry out forest livelihood dependant assessment along with the choice experiment, a detailed household survey based on a representative sample was conducted in two villages of Msimba and Ilonga in Kilosa District. To ensure for a representative sample, the survey used national level sample frame established in 2012 by the Census Department of the National Bureau of Statistics (NBS). From the frame villages were selected purposively to target those under REDD+ pilot. In the respective villages, respondents were drawn randomly from the list of households. The total number of households (n) to be surveyed was determined using the formula:

$$n = \frac{N}{1 + Ne^2}$$

Where

n = sample size

N = total number of households in the area; and

E = desired margin of error.

A total of 110 households were selected randomly in the two villages of Msimba and Ilonga.

Choice Model for communities' livelihood preferences to abandon forest degrading activities

In assessing the willingness of the communities to abandon the activities that would seem to fuel degradation of the land and opt for alternative sustainable livelihoods the study used the Choice Model technique. This model presented in the form of repeated choices. More specifically, the sampled respondents were asked to choose between alternative circumstances, defined in terms of their attributes. Therefore, it was assumed the preference utility to be a function of income from lands resources and the various forms of incentives that can be offered to minimise degradation of the lands. Following the Random Utility Model (McFadden, 1974):

(1) $$U_i = V(\mathrm{Re}source1_i, Incentive1_i, Incentive2_i, Incentive3_i; \beta) + \varepsilon_i,$$

where *V*, the observed part of respondent *i*'s utility, is a function of the measurable and observable attributes in the form of resources and any incentive that can be provided to minimise degradation. The compensation attributes enter the function both linearly and as interactions with each other as incentives. To analyse this trade off statistically an error term, ε was added.

The probability that respondent *i* will choose alternative *j* out of a total of *J* alternatives is:

(2) $$. P_{ij} = P(U_{ij} > U_{ij'}) \quad \forall j' \neq j = 1,2,..., J.$$

If the error terms, ε, is *i.i.d*. and follow the type I extreme value distribution (Gumbel distribution), equation (3) translates into the multinomial logit model of the following form:

(3) $$P_{ij} = \frac{\exp(V_{ij})}{\Sigma_{j'=1}^{J} \exp(V_{j'})}.$$

The attribute parameters, β, can be estimated by the maximum likelihood method.

To be able to assess the value of the lands circumstances will be defined in the form of converting farmland into forest, reduced use of the forests, subsidy for improved farming, extension services and land title. Respondents were presented with six choice sets, each one consisting of a set of hypothetical alternatives, varied in terms of attribute levels and benefit alternatives. A base option (the *status quo* or "I don't want to participate) was included as a measure to avoid unrealistic choices for those who might not be interested.

The study estimated a conditional logit model, since there were several options per individual; there was a control for individual fixed effects. The estimation was carried out with STATA 11 Intercooled as usual in the literature (Bateman *et al* 2002). This was estimated using two alternative specifications of the conditional indirect utility, as described below.

The interactions were considered between attributes and hence the conditional indirect utility was written as follows:

$$V_j = \theta_C C + (\theta_P + \theta_{PW})P +$$
$$+ (\theta_{F1} + \theta_{F1Ec} E_C)F_1 +$$
$$+ (\theta_{F2} + \theta_{F2Ec})F_2 + \theta_{LR} LR + \theta_{Fr} Fr +$$
$$+ (\theta_{R1} + \theta_{R1W} W)R_1 + (\theta_{R2} + \theta_{R2W} W)R_2, j = 1,2$$

After estimation of the model above, it was possible to compute the willingness to pay (WTP) for the improvements. For continuous variables the subjective value of attribute *qkj* reads:

$$WTP_{qkj}^{j} = \frac{dI}{dq_{kj}} = -\frac{\frac{\partial V_j}{\partial q_{kj}}}{\frac{\partial v_j}{\partial I}} = \frac{\frac{\partial V_j}{\partial q_{kj}}}{\frac{\partial V_j}{\partial_{cj}}} = -\frac{dc_j}{dq_{kj}}$$

Where *I* stands for income and $\frac{\partial V_j}{\partial I} = -\frac{\partial V_j}{\partial_{cj}}$.

For binary variables, the relevant expression is as follows:

$$WTP_{q_{kj}}^{j} = \frac{V_j^1 - V_j^0}{\frac{\partial V_j}{\partial I}}$$

Where V_j^i is the conditional indirect utility of alternative *j* when the level of the attribute equals *i* = 0; 1.

The estimation of the coefficient estimates from the model above gage the marginal effects. However, the interpretation of the marginal effects is not always straightforward. It is therefore meaningful to compute the marginal rates of substitution (MRS) between the attributes using one of the coefficients as the numeraire.

$$MRS = -\frac{\beta_{A1}}{\beta_{A2}}$$

The MRS is the rate at which respondents are willing to trade-off one attributes for another, given that everything else is held constant.

Forest governance issues: using a checklist, the researcher also had a wide consultation and discussion on forest resources. This was done by discussing with village governments as well as common people in the respective villages. Also key informants were approached for detailed and sensitive information.

LIMITATIONS OF THE STUDY

The focus of the analysis was a household. However, forest resource affects rural communities as well as individuals' based livelihoods. To have a more comprehensive findings, the study should have covered both household and community issues. This is especially important given the fact that a high proportion of forest resources in Tanzania is owned communally. However, to achieve this it meant more resources in terms of funds and time which was not available. Studies on REDD+ and livelihoods that could capture both parts, case by case are encouraged before a robust policy implication could be developed.

RESULTS

Household Characteristics

The demographic characteristics of the respondents show that of the total sample of 110 sample size, the majority of them were male (88.2%) with an average age of 43.8 years. Regarding marital status, 76.4% were married while the rest were separated (8.2%), divorced (6.4%) or widowed (3.6%) and others were never married (5.5%). Household size was 5.9 persons which is slightly higher than that of the district (4.4 persons) and national average of 4.8 (URT, 2012).

The Poverty levels

The Copenhagen Declaration (1995) described poverty as a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. When people are unable to eat, go to school, or have any access to health care, then they can be considered to be in poverty, regardless of their income (TQT, 2006). Economists measure wealth and poverty in several ways. The three most common measures are income, assets (meaning accumulated wealth in the form of money, securities, and real estate), and socio-economic metrics. Measures in the last category go beyond financial data to account for health, nutrition, infant mortality, sanitation, and other aspects of human well being (IP, 2003).

In this study an attempt was made to assess the poverty levels of the respondents by examining indicators including education, access to health services, income, asset ownership and housing condition. Furthermore, possession of land and tenure were investigated.

Education level

Generally, the education level was very low for all the respondents. About a quarter of the respondents (21.8%) did not complete even standard four and the majority of 61.8 % completed standard seven only. There was insignificant number of respondents in Msimba village (1.7%) who completed ordinary level of secondary education; i.e Form Four; and only about 10.0% of the respondents from Ilonga village reported to have completed Form Four.

The very low level of education is an indication that many people in the study area cannot get good paying employments, even becoming entrepreneurs could be a problem. Conversely, the dependency on natural resources for livelihoods is high and this could be one of the fuelling factors of environmental or forest degradation (Bowonder, 1986; Barbier, 1998).

Health services

An assessment of access to health services show that people walk between 2-5 km to get health services with an average of 2.2km. While health services are not easily accessed, but also too, most of the health centres or dispensaries did not have adequate medicines and other necessary facilities. The assessment by the respondents show that 72% of the respondents reported health services to be poor compared to only 8% who said health services were good and 20% did not notice any difference in the past 10 years. Poor access to health services is also severe (Simba and Kakoko; Manongi 2009). Inadequate medicine in health centres could be one of the reasons for high dependence on traditional medicine in the study area

Land ownership

Generally, land ownership was limited to all the respondents in the two sample villages. Indeed, the median show that majority of the respondents had land acreage of between 1-2 acres only (Table 1). A comparison across the two villages indicates the village of Msimba respondents to own relatively bigger land (about 3.9 acres) compared to Ilonga village (3.2 acres). However, there was a high standard deviation of 3.0 acres of land ownership for Ilonga respondents; suggesting a high level of inequality of land ownership in the village. In such a situation of high

scarcity of land ownership and where the opportunity cost of changing land use pattern is very high, it would imply that land is allocated to the most paying activities. REDD+ need to come up with incentive packages which will be more rewarding than the current land use practices in the study area.

Table 1: Land size by sample village (acres)

Villages	Sample households	Mean	Median	Std Dev	Min	Max
Msimba	60	3.9	1.5	1.8	0.5	7.0
Ilonga	50	3.2	4.0	3.0	1.0	15.0

Source: Survey Data 2011

Mechanism for acquiring land and tenure

Approximately 50% of the respondents in the two villages acquired land through inheritance. Surprisingly, as high as 18% of the respondents, acquired land through bush/forest clearance. This is an indication of implementation failure of the conservation policies which prohibit bush/forest clearance without a legal permission. The status of land tenure by all the respondents was customary ownership. Although customary ownership is recognised by the Tanzania's Village Land Act of 1999, it has its own limitations. It is not being recognised in many official transactions e.g collateral for bank loans. Generally, in many developing countries, tenure in forest is not clear and is subject to dispute. Such a situation is likely to place limits on the effectiveness, efficiency and equity of REDD+ (Sunderlin *et al* 2009). REDD+ could also constitute a new threat or intensify others, particularly in places where indigenous tenure rights have not been recognized (Dam, 2011).

Assets Ownership

Asset ownership is crucial to reducing poverty over time. Much research has found a relationship between asset ownership and poverty levels (Attanasio and Szekely, 199).

In this study, 58.0% of the respondents owned bicycles while 68.2% had radio sets and 38.2% had wrist watches. A comparison across the two villages shows no significant difference of asset ownership except for wrist watches where a high proportion of the respondents from Ilonga owned them compared to the Msimba village respondents. The major source of transport especially from one village to another was either by foot or bicycles while the major source of information for the rural dwellers was radio and "word of mouth". In recent years the use of mobile phones for information has been growing in rural communities and have been facilitating communication including seeking information for agricultural markets (Mwakaje, 2010). Nevertheless, most of the assets were of low value and therefore had little impact on poverty alleviation. According to IP (2003), assets mean accumulated wealth in the form of money, securities, and real estate which to a great extent these attributes were lacking among the respondents.

Economic activities

Regarding economic activities, majority (85.4%) of the respondents reported farming as their main economic activity followed by livestock keeping (10.0%) and then employment (6.4%). This means that the dependency on natural resources is high in terms of using land for farming. Also as pointed out earlier, the respondents had limited land. Indeed, Kilosa District has a bad history of social instability and chronic land use conflicts between farmers and pastoralists to the point of blood shedding. These conflicts to a high extent are attributed by limited land area between the two communities. Farmer–herder conflicts in Africa are often presented as being driven by 'environmental scarcity' (Benjaminsen *et al* 2009).

Dependency on natural resources

Housing profile

About 44% of the respondents had houses thatched with grass made up of walls with mud and poles (38.2%) and mud bricks (16.4%), suggesting a high dependency on the natural resource for building materials. Such houses also do not last long and therefore the impact on natural resources degradation is high. A comparison between the two sample villages indicates that respondents from Ilonga village had relatively more number of durable houses than the ones from Msimba village. About 46% of the respondents from Ilonga reported to have houses that were made of burnt bricks and roofs of iron sheet (Table 2).

Table 2: Housing quality (%)

Village	Msimba	Ilonga	Total
Sample Size	60	50	110
Type of roof			
Thatch grass/leaves	43.3	44	43.6
Tiles	1.7	10	5.5
Iron sheets	46	55	50.9
Type of wall			
Burnt Brick/Cement	40.0	46	42.7
Mud/Mud brick	16.7	16	16.4
Poles and mud	41.7	34	38.2
Poles, branches, Grass	1.7	4.0	2.8

Source: Survey data 2011

Forest related livelihoods by communities

Findings from this study revealed natural resource to play a key role for communities' livelihoods in the two study villages especially for aspects of fuelwood, charcoal, thatching grasses and forest fruits (Table 3). Although the accuracy of these data could be questionable as most of the data provided by the respondents were estimates, no doubt, they indicate the importance of forest resources for livelihoods. Indeed, respondents from Msimba village reported charcoal to be their main source of income where about 80 bags of charcoal are produced per household per annum compared to 36.2 bags for Ilonga. The Msimba village is located along the Mbeya-Dar es Salaam highway and therefore there is easy market access for the charcoal produced. Roughly, residents are making on average of T.shs 1,200, 000 (USD 750) per annum from charcoal selling. To what extent will REDD+ initiatives compensate such forest livelihoods for the communities need to be investigated. For success and sustainability of REDD+ and other initiatives of payment for environmental services the livelihood issue should not be undermined in favour of conservation. While many reports argues that REDD+ will enhance livelihoods or will provide a win-win situation between conservation and livelihoods, the mechanisms to achieve this goal is not very clear in several documentations.

In both villages under study, woodfuel was the main source of energy for cooking and heating. Other forest products collected and used included mushrooms, wild fruits and medicines, thatching grass, honey, building materials, timber and ropes. Moreover, forests are providing ecological functions such as conservation of water sources, biodiversity; et cetera. Forest resources are also used for traditional worshipping, rituals and for circumcision

ceremonies. Generally, the dependence on forest by the local communities is high. Failure of REDD+ to address livelihoods aspects of the communities could lead to unsustainable development.

Table 3: The contribution of forest resources to livelihoods

Forest products Collected	Msimba		Ilonga		**Total**	
	n		n		N	
Mushroom (kg)	28	50.0	18	28.2	46	41.47
Forest fruits (kg)	31	160.0	20	102	51	137.25
Medicines (kgs per year)	35	26	15	19	50	23.9
Thatching grass (bundles per 5 years)	28	121	12	85	40	98
Honey (lts)	0	0	0	0	0	0
Firewood (bundles)	60	372	50	359	110	366.1
Building materials (pcs per 5 years)	45	122.5	38	176.7	83	147.3
Charcoal (bags)	41	83.4	20	32.3	61	66.6
Timber (pcs)	13	116.5	8	96.1	21	108.7
Ropes (pcs)	43	475.0	36	256.0	79	375.2

Source: Survey data 2011

It should be noted also that, most of the value of forest resources have not been captured in these figures as people were not very open to reveal the actual consumption and marketing of the forest products like timber, charcoal and logs because most of them are extracted illegally or are under-priced. These findings, therefore, should be taken as indicative rather than conclusive. The actual value of forest resources is likely to be much higher than what has been reported in this paper.

Revenue from Forest resources per household

An attempt to quantify of forest resources into money terms showed that on average people earn about T.shs 144.040.0 per household per annum from forest resources. Income from timber selling is the highest followed by charcoal (Table 4). This income is significant given the fact that almost half of the forest related livelihoods is not transacted in the markets. They are consumed directly from the forest. Putting money terms into all forest resources could have led to significant earnings at the household levels.

Table 4: Revenue from Forest resources per household

Forest products Collected	**Average harvest per respondent**		**Unit price(T.shs)**	**Revenue/participating individuals (T.shs)=(Q*R)**
	n	Q	R	
Mushroom (kg)	46	0.9	1000	900.0
Forest fruits (kg)	51	2.7	500	1,350.0
Medicines (kgs per year)	50	0.5	200	100.0
Thatching grass (bundles per 5 years)	40	2.5	1000	2,500.0
Firewood (bundles)	110	3.3	1500	4,950.0
Building materials (pcs per 5 years)	83	1.8	1000	1,800.0
Charcoal (bags)	61	1.1	25000	27,500.0
Timber (pcs)	21	5.2	20000	104,000.0
Ropes (pcs)	79	4.7	200	940.0
Total Revenue per household				144,040.0*

Source: Survey data 2011

*1USD=1600T.shs

Assessment of willingness and incentive package preferred by the forest dependent communities

An attempt was made to assess the willingness and choices of incentive of packages by REDD+. The results in Table 5 suggest that incentive packages related to sustainable land use and management as well as more access to forest goods and services were more preferred by a high proportion of the respondents. The results further revealed that incentives in the form of improved farming system such as extension service support, access to better seeds/agrochemicals, provision of rights on land ownership, access to marketing of agricultural products and others were more preferred by the respondents. These findings tallies those of Musa (2012) who reports that the participating farmers under the Equitable Payment for Watershed Services (EPWS) Scheme in Uluguru Mountains were preferring payment in terms of voucher inputs so as to boost agricultural productivity. The other aspect is in favour of agro-forestry and this supports the Mwakaje *et al* (2010) study that showed highest returns from agroforestry and therefore had a strong support by the communities. Such an incentive has also relatively low risks as should the market for carbon fail the communities could still have agricultural crops, logs and timbers. Generally, the findings show no significant difference between respondents' attributes; i.e age, education, income and the preferred incentive packages.

Table 5: Assessment of willingness and preferences on incentives of package for REDD+

CHOICES OF INCENTIVE PACKAGES	Coefficient	Marginal Rate of Substitution	Std. Err.	z
Land use with interaction to property light	5.350072	1	2.94649	1.82
Restricted Access	7.264684	1.357866586	3.503154	2.07
Sustainable land use	8.170632	1.527200382	2.603474	3.14
Tree cutting	6.586416	1.231089226	2.771805	2.38
Intensive farming	6.046658	1.130201238	2.667954	2.27
Land use with interaction to age	**-0.0212626**	**1**	**0.0280303**	**-0.76**
Restricted Access	-0.0472655	2.22294075	0.0373146	-1.27
Sustainable land use	-0.0431342	2.028641841	0.0228341	-1.89
Tree cutting	-0.0325321	1.530015144	0.0252917	-1.29
Intensive farming	-0.0273317	1.285435459	0.0236867	-1.15
Land use with interaction with occupation	**-0.1034639**	**1**	**0.3634256**	**-0.28**
Restricted Access	-0.0655569	0.633621002	0.4925626	-0.13
Sustainable land use	-0.2549364	2.464013052	0.2944625	-0.87
Tree cutting	-0.3543655	3.425015875	0.3380449	-1.05
Intensive farming	-0.0262929	0.254126318	0.2999506	-0.09
Land use with interaction with income	**3.05E-08**	**1.00E+00**	**6.29E-07**	**0.05**
Restricted Access	-4.17E-07	-1.37E+01	9.89E-07	-0.42
Sustainable land use	-1.62E-07	-5.31E+00	5.94E-07	-0.27
Tree cutting	-6.67E-07	-2.19E+01	6.99E-07	-0.95
Intensive farming	-3.38E-07	-1.11E+01	6.19E-07	-0.55
Land use with interaction with education	**0.2186974**	**1**	**0.4524274**	**0.48**
Restricted Access	-0.4609571	-2.107739278	0.6011813	-0.77
Sustainable land use	0.2201194	1.006502135	0.3767814	0.58
Tree cutting	0.4107091	1.877978888	0.4221676	0.97
Intensive farming	0.3287348	1.5031491	0.3880582	0.85

Source: Survey data 2011

DISCUSSION

Assessing the package of REDD+ and the implication to the communities' livelihoods

REDD refers to Reducing Emissions from Deforestation and Forest Degradation. However, "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. It is predicted that financial flows for greenhouse gas emission reductions from REDD+ could reach up to US$30 billion a year. This significant North-South flow of funds could reward a meaningful reduction of carbon emissions and could also support new, pro-poor development, help conserve biodiversity and secure vital ecosystem services (UN-REDD 2009). In the post-2012 period, developing countries could receive financial benefits in return for decreasing their greenhouse gas emissions REDD+ (Campbell, 2009). REDD+ primarily refers to developing mechanisms to make payments to developing countries for reducing emissions from deforestation and forest degradation. A core issue in REDD+ is, therefore, to create a multi-level (international and national) 'payments for environmental services (Angelsen and Kanounnikoff, 2008).

Household versus community benefits

Reducing Emissions from Deforestation (REDD) aims to curb carbon emissions from deforestation by financially compensating forest owners (Ghazoul *et al* 2010). In this study as well as many other developing countries forest resources benefit surrounding communities' both as community and as household in terms of incomes and other livelihoods (see Levitt 2011; Mamo *et al* 2007. I**t** is not clear how the individuals'/ households will benefit from these new arrangements as most of the forests are communally owned. The findings above revealed that forest resource play a key role of livelihoods suggests that any attempt towards implementing REDD+ must take into account this fact. There is a need to recognize and appropriately to compensate the full range of economic, social and political net costs of REDD+ (Ghazoul *et al* 2010). Indeed, some local non-governmental organizations (NGOs) think REDD+ may threaten forest communities' usufruct rights (Melick, 2010). A study in Papua New Guinea revealed that too much initial emphasis was placed on carbon accounting and valuation at the expense of community engagement, and this has derailed REDD efforts (Melick, 2010). If the individual do not really feel the gain from REDD+, forest degradation may continue to happen. Mwakaje *et al* (2010) reports that, despite the adequate knowledge of by-laws governing forest resources, people continued to encroach and degrade the forests contrary to the law. The likeliness of farmers to opt for REDD+ is much lower when also avoiding deforestation of degraded forest since this land is needed for the expansion of farm crops production (Sandker *et al* 2010). Whilst upfront benefits may be preferred by sellers, regular and predictable benefits (e.g. delivered annually) could have important welfare benefits especially at local levels (Angelsen, 2008). Most of the conservation programme provides social services to the affected communities as a way of compensating them but this is not enough incentive to stop them from deforestation and forest degradation as they also need household income to meet other equally important necessities such as paying for education, health, food, assets and so forth.

Inadequate or asymmetric information

Another risk for poor individuals and communities relates to asymmetric information between 'buyers' or funders of REDD+ and 'sellers' (Bracer *et al* 2007). REDD+ projects and development of carbon markets has occurred with virtually no involvement or understanding of most of the forest dependent communities. For example, poor people may not have accurate information about the market value of the carbon services they provide or technical skills necessary to scrutinise the terms of contracts in PES-type transactions (Peskett and Harkin, 2007). In this study most common villagers were not aware about the REDD+ and their role to play; only know that they are required to stop from deforestation and forest degradation and that will be rewarded for that. Only some of the natural resource committees in the villages explained that they are able to determine carbon content of a tree. Generally, communities have not yet received answers to some of their questions with regard to the REDD+. For example, they do not know how they will be rewarded for communal forests they are depending on for their livelihoods should the REDD+ be intervened, who will be handling the money and who will appoint them and further what are the control mechanisms that have been put in place for managing the funds for equitable sharing. Although, a number of villages have received REDD+ money under pilot initiatives the formula to divide varied from one village to another. In some villages households received nothing in some all the money went to households with nothing going to development projects in the district. Also it was not clear how the formulas were developed. It is important that a formula to divide REDD+ wealth should be developed in a participatory manner.

REDD+ governance structures and communities' choices

The main question to ask is can REDD+ schemes be implemented efficiently to address social, economic, and political challenges of developing countries that are forested but characterized by poor governance, low transparency, and corruption? (Melick, 2010). There are concerns that in some African countries, REDD+ funds will

merely support ongoing, poor forest management structures. It is argued that the REDD+ projects in Tanzania will achieve carbon production by supporting the development of a Community Carbon Cooperative hosted within the existing Network of Tanzanian communities engaged in Participatory Forest Management (PFM). However, studies on the impact of PFM have revealed inadequate satisfaction by the communities regarding the governance structures in a number of ways including corruption and lack of transparency (Mwakaje *et al* 2010).

In this study, findings show that despite the existence of several stakeholder groups carrying out different forest related activities in the villages, the majority of the respondents acknowledged that few of the community members benefited directly from their activities. Mwakaje *et al* (2010) revealed that the tendency towards inadequate accountability and transparency either consolidated the position of richer and more influential members of the communities, or conversely resulted in increased marginalization of poorer members of the communities. Due to poor facilitation, there was a tendency to focus districts' and NGOs' extension efforts primarily on the Village Natural Resource Communities (VNRC) with little attention to the wider community to whom the committees were ultimately accountable (Mwakaje *et al* 2010). There was a common tendency towards "*elite capture*" of benefits to the detriment of other community members through monopoly over benefits and manipulation of benefit flows. The study further revealed that many of the VNRC members were either close relative of the village leaders and/or influential members of the communities, or they were politically related to them. With time institutions responsible for management of forests and other natural resources have had a tendency to become lax due to interpersonal relationships, nepotism and corruption among village leaders and forest managers (Mwakaje *et al* 2010). The proposed REDD+ does not indicate clearly on how it will address this institutional weakness. For example, the REDD+ argues that it will focus on building country capacity at both local and national governmental levels. However, the fact is that we have seen most of the activities taking place at the national level, but very little is taking place to communities in rural areas who are the custodian of forests.

The remaining unclear issues by the communities

While the underlying idea of REDD+ is simple, there are complex issues to be resolved such as carbon measurements, scale, funding, permanence, liability, leakages and reference levels (Angelesen, 2008). The respondents in this study raised several pertinent issues in relation to REDD+ programmes. For example, communities were asking when the REDD+ will start disbursing funds and what will be the period between signing for REDD+ and getting the actual benefit from the REDD+. Generally, villagers are discouraged by long periods of waiting for the implementation of REDD+. For example, the Ayasanda village in Manyara Region has been promised for REDD+ activities for quite a long time and nothing is taking place to date. The villagers seem to be tired with this long waiting period for REDD+ to be implemented and this has raised anxiety and despair. The same feeling was shown by the Ilonga villagers in Kilosa district. They are just wondering whether this REDD+ programme will indeed be implemented.

Another issue is about the mechanisms for REDD+ benefit sharing for the affected communities. As the study above indicated many people depend on forest for livelihoods. If not carefully implemented REDD+ systems could present new risks for the poor. These could include factors such as loss of access to land (Tenga *et al* 2008), the concentration of power by elites and distortion effects in local economic systems (Peskett, 2008). It is described (by REDD+) that a financial transfer mechanism will channel financing from the national to the local level, in ways that compensate and provide incentives for community level managers responsible for forest conservation and protection (typically the village natural resources committee members and community forest guards). From these village committees one would ask how these funds will reach the communities at household level to compensate for the lost livelihoods. With governance problems prevalent in Tanzania there is a concern that the lucrative business of REDD+ could end up in the hands of few elite (national and local) at the expense of the majority poor. Corruption has important relationships to poverty. At national scales, corruption can decrease economic efficiency, thereby reducing overall spending on potentially pro-poor policy implementation and; increase inequality (Bird *et al* 2008). Also at a macro level, corruption can affect private investment and public spending, which impacts on growth (Bird *et al* 2008).

At local levels it can directly affect poor people, for example, through the need to pay corrupt officials, which decreases their ability to spend in other areas (Angelsen, 2008). As with other markets, countries with poor governance would receive fewer benefits from REDD+. On the other hand, it is argued that REDD+ could act as an incentive to reduce corruption and improve governance given that financing is likely to be delivered only on the basis of good performance (Angelsen, 2008). This is the situation which every Tanzania would like to see, but as to how this will be achieved, there is little and sometime unconvincing explanations.

Technologies for determining carbon level and the sustainability of the carbon trade

Respondents were furthermore asking how they are going to determine carbon stock and increments and how reliable and sustainable are the REDD+ programmes and carbon markets? In Tanzania there have been several programmes since independence in 1961 such as promotion of *Moringa* trees as alternative cash crop. In some places such projects were sensitized by even technocrats and politicians, but within short time the market ceased to operate. People are sceptical whether this REDD+ and carbon trade will be sustainable as its market is even more complicated than that of *Moringa* business. There is a lot of asymmetry information on carbon trade at the moment where the buyers seem to know better about the trade than the sellers. Nevertheless, the WWF (Tanzania) has started building capacity on the techniques for determining carbon stock in forests; such initiatives are indeed appreciated and they should be scaled up to cover wide areas that are potential for carbon production and trade.

The implication of the results on sustainable development

The findings above revealed a high dependency on forest resources by local communities in the study area both in terms of direct extraction of forest goods and services and financial gain. The forest dependent communities also have revealed their choices or preference in the REDD+ (Table 5). However the REDD+ governance structures do not indicate clearly on how REDD+ benefits will be realized and how the communities' preferred package will be incorporated in the REDD+ governance structures. But also the REDD+ business is likely to be played in asymmetric information where carbon buyers know better about the technical aspects of the carbon trade than the communities. There is concern that REDD+ is likely to address deforestation issues successfully but at the expense of the communities livelihoods and this will lead to unsustainable development. REDD+ must seek to address economic, environment, social and institutional dimensions of sustainable development (Bartelmus, 2011).

CONCLUSION AND RECOMMENDATION

This study was conducted to provide empirical evidence on whether REDD+ will compensate adequately forest dependant livelihoods in Tanzania and achieve forest conservation with the case study of Kilosa District. This was approached through examining the REDD+ incentive package and linking it with the affected communities' preferences using a Choice Model approach. The findings revealed that the REDD+ has potential to impact positively in the reduction of deforestation but uncertain regarding livelihoods sustainability. A high proportion of the respondents choose incentive package of REDD+ that could take into consideration sustainable utilisation of forest resources, intensify agricultural production and build capacity on agro-forestry farming systems. It is not clear how the preferences by the communities will be incorporated in the REDD+ governance structures. There is a concern that while REDD+ implementation is likely to enhance forest conservation, the livelihood aspects of the forest dependent communities might end up be jeopardised. Communities also are not conversant on how carbon in the forest is determined and because of this, the carbon business under REDD+ is likely to be conducted in asymmetric information where the buyer knows better about the quality and quantity of the product than the sellers. This may lead to opportunism in REDD+ business where the buyer may gain more than the sellers. The proposal that REDD+ will base on existing forest governance structure including Joint Forest Management (JFM) and Participatory Forest Management (PFM) models is not appealing. There is evidence that the performance of the two models on livelihoods has been unsatisfactory (Ndhahani**,** 2010**)**. REDD+ need to be more innovative to address all these immerging issues and concerns as well as learning from the past related programmes. Failure to address them REDD+ will lead to unsustainable development.

It is recommended that for REDD+ to work efficiently, the choices preferred by the affected communities should be the centre of incentive package. Respondents generally prefer sustainable utilisation of forest resources, intensify agricultural production and access to markets and; build capacity on agro-forestry farming systems. There should also be capacity building on governance especially on the inter-linkages of REDD+ between local, national and international should be well explained. The institutions under REDD+ should involve forest dependent communities on full swing in all decision making levels and should be gender mainstreamed. The current situation is that the management of forest resources is dominated by the elite at the expense of the majority. Also the study caution that any tendency of copying directly the existing models of joint forest management (JFM) and participatory forest management (PFM) without any modification could result in negative impacts on livelihoods. Studies on JFM and PFM reveal unsatisfactory performance on livelihoods. Capacity on carbon determination, funds management, payment mechanisms and enhancement of alterative income sources at household levels should be the focus of REDD+.

Acknowledgements

The author would like to thank the Climate Change Impacts, Adaptation and Mitigation (CCIAM) programme, for funding this study. Gratitude is particularly due to the respondents in Kilosa district who despite their tight schedule,

agreed to participate in the interviews and provided useful information. Furthermore, the author is grateful to the government officials, REDD coordinator in Kilosa district and academic community for providing technical information on REDD related issues.

REFERENCES

Adhikari, B., Di Falco, S. and Lovett J.C. (2004). Household characteristics and forest dependency: evidence from common property forest management in Nepal. Ecological Economics 48 (2): 245-257.

Angelsen, A. and Wertz-Kanounnikoff, S. (2008): *Moving Ahead with REDD: Issues, Options and Implications by Angelsen (ed).* Published by the Center for International Forestry Research (CIFOR). Subur Printing Indonesia.

Angelsen, A. (2008): REDD Models and Baselines. *International Forestry Review*. 13 (2): 163-176.

Attanasio, O. and Szekely, M. (1999): An Asset-Based Approach to the Analysis of Poverty in Latin America. IDB Working Paper No. 109. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1814653.

Barbier, B. (1998): Induced innovation and land degradation: Results from a bioeconomic model of a village in West Africa. Agricultural Economics 19 (1-2): 15-25.

Bartelmus P. (2011): Green Accounting: Balancing Environment and Economy.
http://thesolutionsjournal.com/node/1105. Accessed December 2012.

Bateman, I.J. , Carson, R T., Day, B., Hanemann, M., Hanleys, N., … Hett, T, Jones-Lee M., Loomes G., Mourato S., Ozdemiroglu E., Pearce D., Sugden R., and Swanson J (2002). Economic valuation with stated preference techniques: a manual. Edward Elgar pp 448.

Benjaminsen, A., Maganga, F.P. and Abdallah, J.M. (2009): The Kilosa Killings: Political Ecology of a Farmer–Herder Conflict in Tanzania. Development and Change 40 (3): 423–445.

Bird, R.M., Jorge Martinez-Vazquez J. and Torgler, B. (2008): Tax Effort in Developing Countries and High Income Countries: The Impact of Corruption, Voice and Accountability. Economic analysis and Policy 38 (1): 55-71.

Bowonder, B. (1986): Deforestation in developing countries. *Journal of Environmental Systems* 15 (2): 171-192.

Bracer, C., Scherr, S., Molnar A., Sekher, M., Ochieng, B.O. and Sriskanthan, G. (2007): Organization and Governance for Fostering Pro-Poor Compensation for Environmental Services. Working Paper. http://www.worldagroforestry.org/downloads/publications/PDFs/wp14961.pdf. Accessed November 2012

Burgess, N.D., Bahane, B., Clairs, T., Danielsen, T., Dalsgaard, S., Funder, M., Hagelberg, N., Harrison, P., Haule, C., Kabalimu, K., Kilahama, F., Kilawe, E., Lewis, S.L., Lovett, J.C., Lyatuu, G., Marshall, A.R., Meshack, C., Miles, L., Milledge, S.A.H., Munishi, P.K.T., Nashanda, E., Shirima, D., Swetnam, R.D., Willcock, S., Williams, A. and Zahabu, E. (2010). Getting ready for REDD+ in Tanzania: a case study of progress and challenges. Reducing emissions from deforestation and forest degradation: Papers. Oryx 44: 339-351.

Campbell, B. (2009). Beyond Copenhagen: REDD+, agriculture, adaptation strategies and poverty. Global Environmental Change 19(4):397-399.

Chhatre, A., and Agrawal, A. (2010). Trade-offs and synergies between carbon storage and livelihood benefits from forest commons: http://www.pnas.org/content/106/42/17667.short. Accessed 2 January 2012.

Sunderlin, W.D., Larson A.M. and Cronkleton, P., (2009). *Forestry Tenure Rights and REDD+: From Inertia to Policy Solutions.* In Angelsen (2009) (ed):*Realising REDD+: National Strategy and Policy Options.* Centre for International Forestry Research. Printed in Denmark.

Danielsen, F., Skutsch, M., Burgess, N.D., Jensen, P.M., Andrianandrasana, H., Karky, B., Lewis, R., Lovett, J.C., Massao, J., Ngaga, Y., Phartiyal, P., Poulsen, M.K., Singh, S. P., Solis S., Sørensen, M., Tewari, A., Young, R. and Zaha, E. (2011): At the heart of REDD+: a role for local people in monitoring forests? Conservation Letters 4 (2) 158–167.

Gausset Q., Lund J.F., Theilade I., Nathan I., Hansen H., Mugasha A.G., Yonika Ngaga Y., Andersen S.K and Nielsen S.T (2007). Why Combine Private and Communal Tree Management? A Case-Study Based in Majawanga (Gairo, Tanzania). The Journal of Transdisciplinary Environmental Studies. 6, no. 1.

Ghazoul J., Butler R.A., Mateo-Vega J and Lian Pin Koh L.P (2010): REDD: a reckoning of environment and development implications. Trends in Ecology and Evolution 25 (7) 396–402.

Gomes R., Bone S.,, Cunha M, Nahur A.C., Moreira P.F., Meneses-Filho L.C.L, Mauricio Voivodic M., Bonfante T, and Moutinho P (2010). Exploring the Bottom-up Generation of REDD+ Policy by Forest-dependent Peoples

Exploring the Right to Diversity in Conservation Law, Policy, and Practice Policy Matters. http://www.ibcperu.org/doc/isis/13435.pdf. Accessed 20 November 2011.
Harrison, P. (2006). Incorporating Livelihood Assessments and Options for Future Management of Udzungwa Forests. Socio-Economic Study of Forest-Adjacent Communities from Nyanganje Forest to Udzungwa Scarp: A Potential Wildlife Corridor. http://cepf.tfcg.org/downloads/SocioEco_Udz_Scarp.pdf Accessed 15 November 2011.

Hiraldo R and Tanner T (2011). Forest Voices: Competing Narratives over REDD+. *IDS Bulletin.* Special Issue. Political Economy of Climate Change. 42 (3) 42-51.

IRA (2012): Institute of Resource Assessment, University of Dar es Salaam, GIS Lab modified from Google search.

IP (2003). Info please, Wealth and Poverty. What Is Poverty? http://www.infoplease.com/cig/economics/poverty.html. Accessed 12 November 2011.

Juma, D. and Manongi, R. (2009). Users' perceptions of outpatient quality of care in Kilosa District Hospital in Central Tanzania. Tanzania Journal of Health Research 11 (4)
Kanowski, P.J., VitaeMcDermott, C.L and VitaeCashore B.W. (2011): Implementing REDD+: lessons from analysis of forest governance. Environmental Science and Policy 14 (2): 111–117.

Kepe T., Saruchera M and Whande W (2004). Poverty alleviation and biodiversity conservation: a South African perspective. Oryx 38:143-145
Lawlor K, Weinthal E and Olander L (2010): Institutions and Policies to Protect Rural Livelihoods in REDD+ Regimes. Global Environmental Politcs 10 (4):1-11.

Levitt T (2011). Warning over REDD projects excluding rural poor from forests. http://www.theecologist.org/News/news_analysis/939007/warning_over_redd_projects_excluding_rural_poor_from_forests.html Accessed 20 December 2011.

Mamo G., Sjaastad E and Vedeld P (2007). Economic dependence on forest resources: A case from Dendi District, Ethiopia. Forest Policy and Economics 9 (8): 916-927
McFadden D, (1974). Conditional Logit Analysis of Qualitative Choice Behaviour. Chapter 4. http://elsa.berkeley.edu/pub/reprints/mcfadden/zarembka.pdf. Accessed November 2012.

Melick D (2010): Credibility of REDD and Experiences from Papua New Guinea. *Conservation Biology*. 24 (2): 359–361

Misturelli F and Heffernan C (2008). *What is poverty? A diachronic exploration of the discourse on poverty from the 1970s to the 2000s.* Special Issue: India's Semi-Arid Rural Economy: Livelihoods, Seasonal Migration and Gender. *The European Journal of Development Research*. 20 (4): 666-684.

Musa K (2012): Equitable Payment for Watershed Services: The Case of Uluguru Mountains. MSC Dissertation, Institute of Resource Assessment, University of Dar es Salaam. Unpublished.
Mwakaje A.G., Kahyarara, G., Mung'ong'o, C.G and Kauzen, A. (2010): the potential of reducing emissions from deforestation and degradation (REDD) for rural development in Tanzania**:** Cases from Babati, Hai and Kilosa districts, Final Report submitted to the REDD Secretariat in Tanzania.

Peskett, L. and Harkin, Z. (2007). Risk and responsibility in Reduced Emissions from Deforestation and Degradation. ODI Forestry Briefings.

Sandker, M., Nyame, S.K., Förster, J., Collier, N., Shepherd, G., Yeboah, D., Ezzine-de Blas, D., Machwitz, M., Vaatainen, S., Garedew, E., Etoga G., Ehringhaus C., Anati J., Dankama OKwasi Quarm D.O and Campbell, B.M. (2010): REDD payments as incentive for reducing forest loss. Conservation Letters 3 (2) 114–121.

Scherr, S.J., White, A. and Kaimowitz, D. (2003). A new agenda for forest conservation and poverty reduction. Making markets work for low-income producers. Forest Trends. http://www.forest-trends.org Washington, D.C. Accessed November 2011.

Simba, D. and Kakoko, D. (2012): Access to subsidized artemether-lumefantrine from the private sector among febrile children in rural setting in Kilosa, Tanzania. Tanzania Journal of Health Research 12 (4).

Smith J and Scherr S.J (2003): Capturing the Value of Forest Carbon for Local Livelihoods. World Development 31 (12): 2143-2160.

Sunderlin, W.D., Larson, A.M. and Cronkleton, P (2009). *Realising REDD+ National Strategy and Policy Options.* Edited by Angelse, A. Brockhaus, M.M Kanninen, M., Sunderlin, W.D and Wert-Kanounwikoff S (eds). *Realising REDD+: National Strategy and Policy Options*, Centre for International Forestry Research Bogor, Indonesia. Printed in Denmark ISBN 978-6-02-8603035.

Tenga, R., Mattee, A., Mdoe, N., Mnenwa, R., Mvungi, S. and Walsh, M. (2008):
A study on options for pastoralists to secure. Their livelihoods in Tanzania. Current policy, legal and economic issues. Volume One: Main Report.

Timko, J.A., Waeber, P.O. and Kozak, R.A (2010). The Socio-Economic Contribution of Non-Timber Forest Products to Rural Livelihoods in Sub-Saharan Africa: Knowledge Gaps and New Directions. International Forestry Review. 12(3): 284-294.

TQT (2006). ThinkQuest Team, Social Definitions of Poverty.
http://library.thinkquest.org/05aug/00282/over_whatis.htm. Accessed November 2011

UN-REDD (2009) About REDD+.
http://www.un-redd.org/AboutREDD/tabid/582/Default.aspx. Accessed November 2011

URT (1996): Morogoro Region Socio-economic Profile. Unpublished.

URT (2002): *Population and Housing Census General Report*. Central Census Office, National Bureau of Statistics, President's Office Planning and Privatization. Dar es Salaam, Tanzania, Government Printer.

URT (2010): United Republic of Tanzania. District Annual Report. Unpublished.

Van Dam C (2011). Indigenous Territories and REDD in Latin America: Opportunity or Threat? *Forests* 2(1): 394-414.

WB (2011): Population density (people per sq. km) in Tanzania. Tanzania – Population http://www.tradingeconomics.com/tanzania/population-density-people-per-sq-km-wb-data.html. Accessed November 2012

Zahabu, E., Skutsch, M., Malimbwi, R.F and N.G. Nordholt S N.G. (2008): The Likely Mechanism for Implementing REDD Policy in Tanzania.
http://www.communitycarbonforestry.org/NewPublications/Likely.pdf. Accessed November 2012