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Assessing the key enablers for REDD+ to achieve credible mitigation and sustainable livelihood outcomes at the local level: evidence from Kenya

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Assessing the key enablers for REDD+ to achieve credible mitigation and sustainable livelihood outcomes at the local level: evidence from Kenya

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Abstract

Achieving cost-effective mitigation and sustainable livelihoods through reducing emissions from deforestation and forest degradation (REDD+) depends heavily on the local context within which a REDD+ project is implemented. Yet little information exists on how local people and their assets can promote or impede REDD+ activities. This paper empirically assesses the set of enabling assets for REDD+ projects to deliver credible emission reduction and sustainable livelihoods. Evidence is drawn from the first internationally accredited REDD+ demonstration project in Africa, the Kasigau Corridor project. Households stratified by wealth and equally sampled within project and non-project sites, were interviewed to explain and rank the actual and potential interaction between specific livelihood assets and the project's activities. Focus group discussions and in-depth interviews triangulated household information and identified the most strategic assets. Results show that pro-poor asset composition such as integrated land tenure and water access strategically enables the project to reduce emission leakage and promote inclusive livelihood benefits. The majority of poor peasants depend on communal forest for charcoal income and thus felt that including communal forest as part of REDD+ entitled them to benefits and such benefits would keep them off protected forests. Water scarcity was responsible for failure in rain-fed agriculture and associated emission leakage through illegal charcoal burning in protected forests. Project efforts are impeded and complicated by exclusive state institutional control of land and water. Nonetheless, supporting pro-poor assets is one key strategy that projects can adopt towards reconciling global mitigation needs with local livelihood priorities.

Key words: enablers, dry land forest, livelihood assets, pro-poo, REDD+

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1.0. Introduction

Reducing emissions from avoided deforestation and forest degradation (REDD+) has gained institutional legitimacy as a mechanism linking carbon management to human development (Bond et al. 2009). Negotiations at the United Nations Framework Convention on Climate Change (UNFCCC; decision 2/COP13; decision 4/COP15; decision 1/COP16), have formalised REDD+ as a cost-effective mechanism for addressing the drivers of deforestation in developing countries, thereby reconciling a mitigation potential of 20–30 % of all CO_2 emissions annually with sustainable livelihoods (FCPF et al. 2010; UNFCCC 2010). The emission reduction and livelihood goals are part of REDD+ methodological and financial mechanisms. REDD+ projects aim to work with local assets such as forests and institutions, and these may contribute to fostering support and/or creating barriers to REDD+ design activities (Dyer et al. 2014; Mbow et al. 2012; Mustalahti et al. 2012; Sills et al. 2009). Understanding the set of local assets vital for REDD+ goals is necessary to inform literature and policy support for successful project design and implementation.

Forest cover and associated biomass and carbon are priority requirements for REDD+ projects to meet emission reduction targets. Studies have shown that existing demonstration projects are largely located in areas and countries endowed with forest resources (Atela et al. 2014; Sills et al. 2009). This may explain why countries with relatively expansive tropical forests currently attract more REDD+ projects. For example, the dense and expansive tropical forests of Latin America generated 6.2Mt C of forestry carbon offsets in 2012 – almost double the credits (3.2Mt C) from Africa (Peters-Stanley et al. 2013).

Aside from adequate forest cover requirements, a host of other contextual socio-economic factors determine the feasibility of REDD+ projects and investments in particular areas or countries with comparable mitigation potential. For example, while the Democratic Republic of the Congo has forest biomass carbon stocks of between 20,416 and 36,670Mt C, almost twice Indonesia's biomass stock of 10,252–25,547Mt C (Gibbs et al. 2007), Indonesia hosts more than twice the number of REDD+ projects. Similarly, the forest biomass potential for Kenya is between 163 and 618Mt C, almost ten times less than Mozambique's potential of 1894–5148Mt C; yet there are twice as many REDD+ projects in Kenya as in Mozambique (CIFOR

2014). Literature shows that certain areas with mitigation potential within Kenya, such as dryland ecosystems, are left out of REDD+ investments due to socio-economic factors perceived to be unfavourable for REDD+ projects (Atela et al. 2014). Existing local socio-economic factors, such as land tenure governance and local organisations strongly influence whether potential mitigation can be realised alongside livelihoods (Mustalahti et al. 2012).

Local socio-economic conditions are diverse and complex. The sustainable livelihood framework (Scoones 1998) classifies these as livelihood assets. Livelihood assets are tangible and intangible goods and services owned and used by households or communities for living and are sorted into five broad categories: natural capital, financial capital, human capital, social capital and physical capital (Scoones 1998). Emission reduction under REDD+ builds directly on the natural assets, such as land, forests and air, from which most rural populations draw livelihoods. Financial assets, including income, savings and fixed assets (Vincent 2007), are equally useful in the local context, particularly as they allow households or communities to pursue various livelihood strategies including farming and business, and in so doing may structure the drivers of deforestation under REDD+ (Boyd et al. 2007). Capabilities, skills, education and employment are human assets (Gupta et al. 2010; Jones et al. 2010; Brooks et al. 2005) that aid the successful pursuit of different livelihood strategies and even in understanding the contents and objectives of REDD+ projects. Social assets include household/community networks, social claims, affiliations and associations that help households or communities in coordinating their livelihood strategies (Vincent 2007; Scoones 1998) and their engagement in a REDD+ project (Maraseni et al. 2014). The mix of these assets at household and community level may impede REDD+ or make it successful in terms of achieving global mitigation goals and local livelihood needs. For instance, weak land tenure at the local level may reportedly be a barrier for credible and legally defendable emission reductions in REDD+ projects (Chhatre et al. 2012; Jindal et al. 2008).

The UNFCCC expects REDD+ projects to support livelihood asset requirements in their implementation (appendix 1/COP16). In doing so, projects may reshuffle assets (project-impact) in a manner that either benefits or harms local communities (Skutsch and McCall 2010; Peskett and Brockhaus 2008). Projects may support the

local people with alternative livelihood activities to compensate for the loss of forest-based livelihoods when forests are protected for emission targets. Studies on forest ecosystems, such as the tropical humid forests of Kenya (Thenya and Kiama 2008), Burkina Faso, Mali and Ghana (Nkem et al. 2012) and the Miombo woodlands of Southern Africa (Kalaba et al. 2013; Shackleton et al. 2007), show close links between rural livelihoods and forest goods and services such as grazing resources, water, fuel-wood and charcoal. Empirical studies on the impacts of internationally certified REDD+ projects are however scarce, especially for Africa. Positive impacts have been reported in a plethora of studies on REDD+ impacts in South America and Asia (Boyd et al. 2007; Robertson and Wunder 2005; Asquith et al. 2002), with some positive impacts also noted in the N'hambita project in Mozambique (Jindal, 2008). Negative impacts of REDD+ have been theorised mainly around elite capture of rights to forests by commercial and state actors in REDD+ funds (Corbera and Schroeder 2011) and some problems have been noted in the N'hambita project (Marthur et al., 2014). Such elite capture may include non-adherence to agreed benefit sharing procedures as was reported in West Africa (Hashimu 2012). Case study insights are required to provide lessons for more rigorous assessments that could prepare developing countries better for REDD+ and inform sustainable design of national programmes and sub-national REDD+ projects.

This paper aims to understand the set of local assets useful for the achievement of REDD+ mitigation and livelihoods goals based on analysis of the local-level Kasigau REDD+ project in Kenya. The specific objectives are to: (1) evaluate how the project engages the community in forest protection procedures and benefit sharing; (2) assess which livelihood assets are most influential in reducing deforestation and enhancing livelihoods from a wealth perspective; (3) evaluate the corresponding impacts of the project on forest conservation and livelihoods; and (4) explore the policy spaces for supporting strategic livelihood assets for REDD+.

2.0. Research design and data collection

2.1. Research design and site selection

An initial mapping of REDD+ projects in Kenya (Atela et al. 2014) guided the case project selection process. The Kasigau Corridor REDD+ project was selected based

on its international accreditation through the Voluntary Carbon Standard (VCS) and relatively longer period of engaging local communities in a relatively vulnerable setting. The majority of internationally linked REDD+ projects operate under the VCS (Peters-Stanley et al. 2013), which suggests that the Kasigau project could offer scientific and policy lessons applicable in a wide range of contexts. The project is located in the Kenyan Coastal region, three degrees south of the equator and about 150km northwest of Mombasa City.

A matched control intervention (MCI) research design was used to analyse interactions between the project and its impacts on livelihoods. MCI entails establishing a project-livelihood interaction based on data from intervention and control sites (see Jagger et al. 2010). The MCI approach improves data quality, removes counterfeit attribution and so provides a factual understanding of what works for people (Caplow et al. 2011). Rapid rural appraisal with project extension staff and community informants was conducted prior to data collection to aid the site selection process by contextualising and matching rural conditions for the intervention (REDD+ project) and control (no REDD+ project) sites. Maungu and Mbololo villages were selected as representative intervention and control sites respectively (Table 1). Retrospective data (Schreckenberg et al. 2010) that was obtained from the Kenya National Bureau of Statistics (2007) was used to check on the matches. Selected field sites are 26 km apart, which reduces possibility of spill-over impacts from the project to the control site.

Table 1: Characteristics of the study sites.

Attribute	Maungu (treatment)	Mbololo (control)
Geographical location	3° 33' S / 38° 45' E	3° 16' S / 38° 28' E
Distance from the project	0.5km	26km
Ethnic composition	Taitas	Taitas and Durumas
Agro ecological condition	Semi-arid	Semi-arid
Main livelihood activities	Farming	Farming
Existing forest resources	Ranches, communal forest	Ranches, trust and communal forest
Forest management	Private, communal and trust	Private, communal and trust
Vulnerability index*	0.917	1.014
Land ownership	Private and communal	Private and communal

*Atela et al. (2014)

2.2. Data collection

2.2.1. Initial review of project documents and consultations with project staff

Project staff were consulted and a content analysis of project documents was undertaken to evaluate the project's activities in terms of forest protection for carbon, community participation and benefit sharing. Relevant staff and documents aligned to various project components were selected using a snowball technique. The snowball technique usefully aided the identification and access of relevant project staff and documents (see e.g. Atkinson & Flint, 2001). Projects objectives, activities and community engagement modalities were identified as key features shaping the projects' implementation (Minang and van-Noodwijk, 2013).

2.2.2. Household questionnaire

A household questionnaire (n=100) was used to assess how the local livelihood assets influence project activities (asset-impact) and the corresponding impact of the project on these local assets (project-impact). Random samples of households were drawn equally from the intervention and control sites. To obtain a realistic account of project-asset interactions, intervention households were selected from a list of members belonging to Community Based Organisation (CBO) the Maungu Hills Conservancy, through which the REDD+ project engages community members and disseminates benefits (Figure 1). Control households were sampled from Mraru and Tausa ranch groups, which work closely with conservation projects in the area. The intervention and control samples represented 20.1 % (50 of 280 registered households) and 19.4 % (50 of 285 registered households) of the sampling frame respectively. Village elders in each location assisted in categorising all households in the target groups (CBO and ranch groups) into low, middle and high wealth status, given their deeper understanding of individual household's assets (van Vliet 2010). Household land holdings, livestock numbers and educational capabilities were used to define the wealth categories. Of the 50 households in each location, 24 low-wealth, 16 middle-wealth and 10 high-wealth households were interviewed.

Households were interviewed using questionnaires composed of open and closed questions. Questions for the intervention and control households were matched. The first three parts of the questionnaire utilised qualitative and quantitative techniques to detail respondents' livelihood assets regarding natural, financial, human, social and

physical assets and how they access and use these in different seasons. Indicators representing each of the five livelihood asset categories were used as developed from our scoping study (Atela et al. 2014; Atela 2013) and literature (Gupta et al. 2010; Vincent 2007; Brooks et al. 2005).

Respondents were asked to state and explain the positive and/or negative impact of each asset indicator on the activities of the project, particularly on the forest conservation procedures designed by the project. In a similar way, the respondents detailed the impacts of the forest conservation procedures and benefits on the asset indicators. We structured our assessments along these asset-impact and project-impact criteria. While the two overlap as part of the cause-consequence relationship, structuring them in terms of asset-impact and project-impact improved objectivity and clarity in describing project-asset interactions. In assessing the asset-impact and project-impact for each of the asset indicators, an impact score of +1 was assigned to any impact the respondent thought was positive and -1 to any adverse impact from the respondent's perspective. If positive and negative impacts of a particular asset indicator were of equal measure to a respondent, an impact factor of 0 (no overall effect) was assigned. The impact factor scores were then averaged for each asset indicator and wealth categories for quantitative analysis while qualitative responses were used to describe the scores. Household data from the control site were only used in the project-impact analysis where site comparisons were quantitatively possible, but were excluded from the asset-impact analysis because respondents did not have any experience with the project. In comparing project-impact, the quantitative project-impact score for the control group was pre-assigned on a null basis or 'no-effect' scale (0) to remove confounding impacts from the site comparisons given the possibility of livelihood changes driven by the state or other projects even in the absence of a REDD+ project in the control site. Chi-square (Jolliffe 2005) was applied to test significant differences in the impact scores between wealth categories and between sites. Spearman rank correlation coefficient was used to correlate the impact scores of various wealth categories.

The asset-impact scores revealed positive or negative impacts of household assets on the project but did not show the relative strengths of the asset indicators. To further understand the relative strengths of the asset indicators, respondents were asked to rank the three top assets in order of significance to the project's activities.

Three levels of ranking minimised difficulties that respondents might face with asset ranking. A rank of 1 yielded three points for an asset indicator, while a rank of 3 yielded one point for an indicator. The asset ranking points were scaled into percentage levels and compared for each of the assets and between wealth categories.

2.2.3. Focus group discussions and in-depth interviews

Six focus group discussions (FGDs), three in each site, were executed to explore and triangulate the household information. The purposefully selected FGD participants included village elders (n=12), land owners (n=11) and representatives of women, men and youth groups in the community (n=15). The participants discussed household data and identified strategic assets that if tackled would have most impact on the overall project outcomes. A livelihood calendar and its interaction with project activities aided the identification of the strategic assets. Project staff (n=8) were interviewed to verify the importance of the strategic assets to emission reduction and livelihoods and elaborate on the mandate of the project in supporting the assets. State officers drawn from the forestry, environment and agriculture departments (n=3), sampled using a snowball technique, provided information on the role of the state in supporting the enabling assets. The FGD and in-depth interview data were qualitatively analysed using a grounded theory approach (see e.g. Corbin and Strauss 1990).

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3.0. Results

3.1. Asset composition and project activities

The majority of households' assets in both study sites (intervention and control) included communal hills, ranches, on-farm forest and trees, household associations and livestock, and these occurred in varying abundance and ownership claims depending on wealth categories (appendix 1). Within this sequencing of assets, the Kasigau project aims to avoid emissions by conserving a dryland forest constituting private ranches (50–2,500 members per ranch) and community land that spans 500,000 acres and is part of a corridor linking Tsavo East and Tsavo West National Parks, the two largest wildlife protection areas in Kenya. Ranch shareholders signed

conservation easements committing them to ease carbon rights to the project proponents. Community members, through local CBOs, are engaged in activities meant to reduce pressure on the protected forests. A number of community projects are additionally funded through a trust fund, the Wildlife Works REDD+ Project Trust Fund (WWRPTF), which constitutes a third of all carbon revenue and is part of the agreed benefit sharing procedure. Protection of the forests for carbon and community engagement in the conservation activities and benefit sharing (Fig 1) are the key project activities.

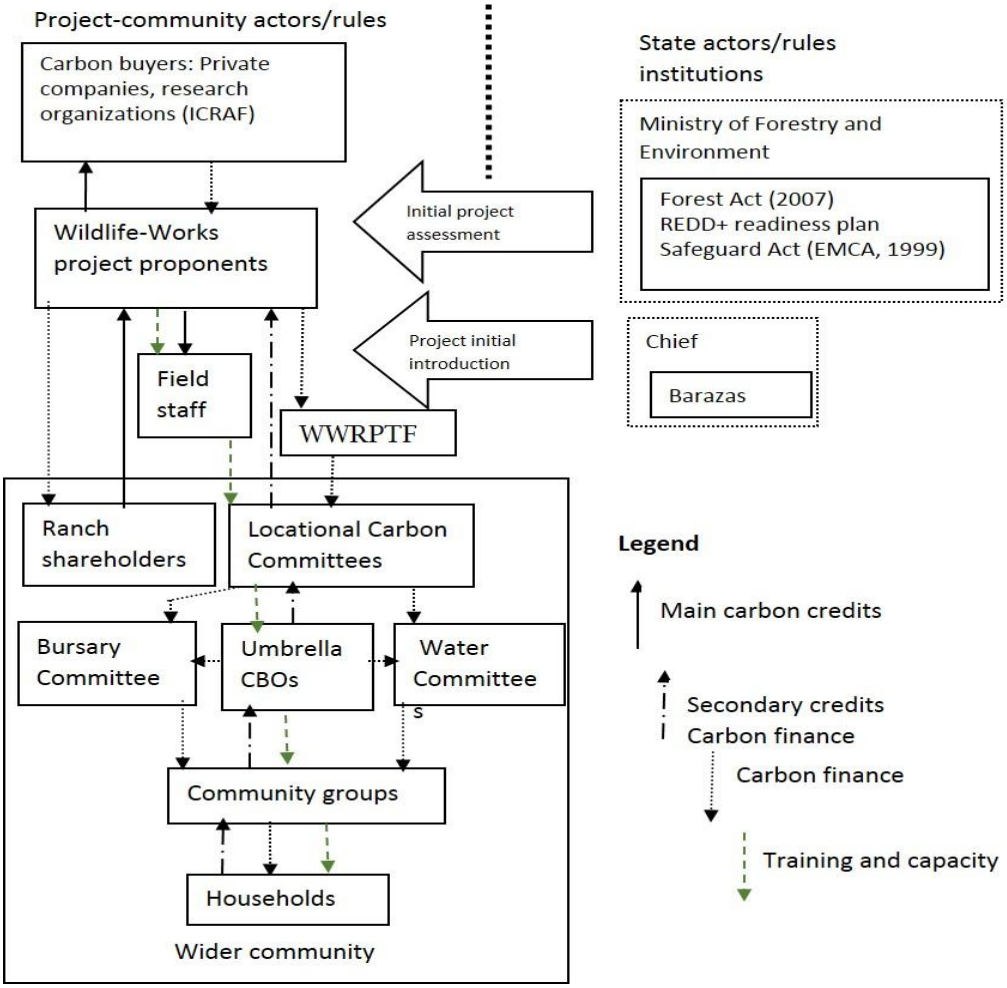

Figure 1: Flow of activities between the project, state and local communities: developed from project design documents and staff interviews

3.2. Impacts of household assets on project activities (asset-impact)

Household assets influenced project activities (asset-impact) in different ways (Table 2) and depending on the wealth category (Figure 2). The low-wealth households, on average, perceived that most of their assets – mainly water access and land ownership, productivity and size – negatively impacted on the protection of the forests. Low-wealth respondents felt that their poor access to water resources and unreliable rainfall negatively affected their main livelihood activity of farming, and this raised pressure on the protected ranches and community hills (Table 3). Most of these low-wealth households also lack legitimate titles, and at the beginning of the project they feared that the project and its associated immigrants could take over the communal lands to which they lay claim. Household membership to an association was the only low-wealth asset perceived to be positively influencing the project (+0.4). Most middle-wealth respondents felt that their land size and economic activities influenced the project activities positively. This group felt that pursuing farming as an economic activity within their relatively large land parcels enables them to undertake agroforestry practices that reduce pressure on the protected forests. This group, however, felt that decreasing land productivity may make them change land use to non-agricultural practices or sell it to other developers who may not have a conservation agenda, and this would affect the project's emission reduction targets (Table 4). The asset-impact scores by the high-wealth households were mostly positive for land ownership. Most high-wealth households receive carbon revenues from their shares in the ranches and are now motivated to commit part of their larger parcels to on-farm forests for sale of carbon.

Overall, water access, land productivity and land ownership had the highest negative scores while membership to an association had the highest positive score (Table 3).

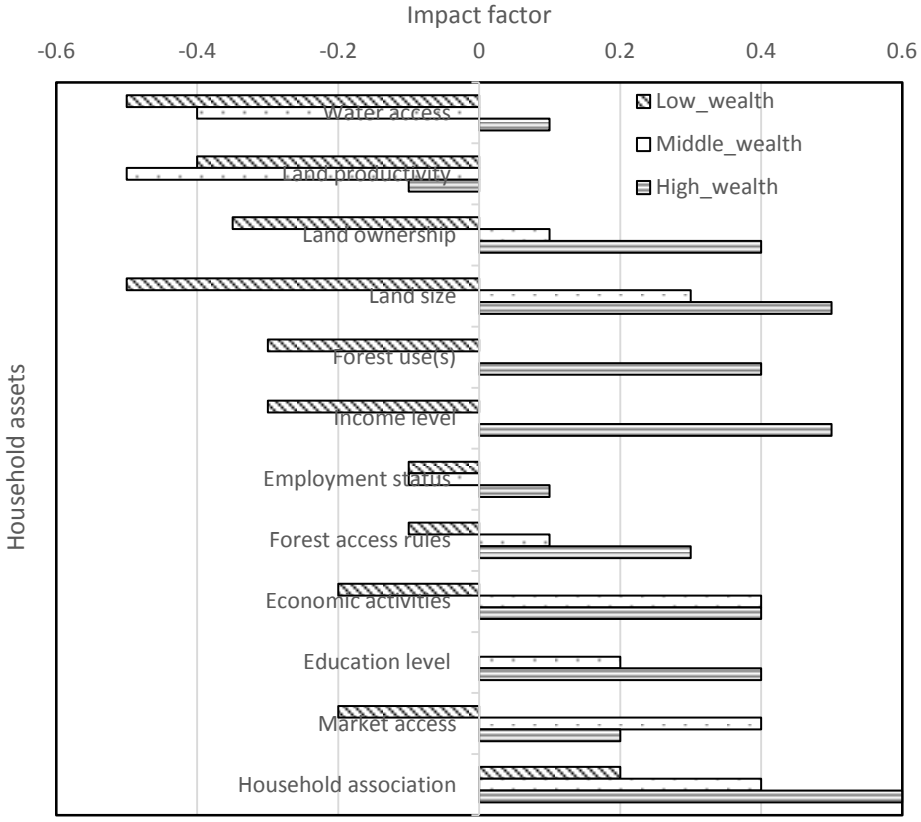

Figure 2: Impact factor of assets on the project differentiated by household wealth status

Table 2: Overall impacts of household asset (asset-impacts) on the protection of forests (ranches and communal forests) for reducing emissions under the Kasigau REDD+ project

Asset Category	Asset indicator	Overall
Social	Forest access rules	0.02
	Household association	0.38
	Land ownership	-0.28*
Natural	Land size	-0.1*
	Land productivity	-0.3
	Forest use(s)	-0.1*
Financial	Economic activities	0.04
	Income level	-0.1
Human	Education level	0.1
	Employment status	-0.1
Physical	Water access	-0.5*
	Market access	0.1*
Aggregate		-0.1

*0.05 significance between wealth categories

Table 3: Qualitative impacts of high high-rank assets on the project; [Negative impact (-) No impact (0) Positive impact (+1)]

Asset	Main impacts of the assets on the project		
	Low-wealth	Middle-wealth	High-wealth
Water access	(-) Unreliable rainfall/water sources; reduced land productivity and increased pressure on forest/tree resources	(-) More time spent in searching for water instead of tree planting	(-) Unreliable rainfall/water sources; carbon related trees drying up (+) Water scarcity enables good water business
Land ownership	(+) Communal land benefits all (-) No title deed; fear of project and rich people acquiring titles of the communal land	(-) Competing land value such as sale of the land to a higher bidder	(+) Have land title deeds thus commitment to plant trees for carbon credits (-) Availability of title deed-conversion of land to non-carbon land uses
Land productivity	(-) Decline in productivity; pressure on forest/tree resources to fill the production gap	(-) Decline in productivity; more time in non-farm activities instead of farm/land carbon related activities	(-) Decline in productivity; reduced residue volume for livestock resulting in forest based grazing
Economic opportunities	(+) Declining economic activities increase the household willingness to be part of the project (-) Charcoal/firewood gathering as economic activity increases pressure on tree/forest resources	(+) Farming as an economic activity enhances on-farm conservation activities for carbon	(+) Household with stable/diversified economic activities reduces charcoaling within the protected forest for REDD+

The ranking of the relative influence of assets on the protection of forests for emission reduction shows that water access, land ownership, economic activities and land productivity are high-rank assets compared to others. These high-rank assets were mainly rated to have negative impact on the project work (see Table 3). These assets play crucial roles in diversifying communal livelihoods within the livelihood calendar. The calendar shows that the poor in times of drought sometimes pursue eco-charcoaling activities involving charcoal making from fallen leaves and logs as an alternative to charcoal burning; others pursue casual labour on neighbours' farms and sometimes food for work initiated by a World Vision project. The food for work and eco-charcoaling options are largely seasonal and not open to a majority of the poor, who still sometimes opt to illegally burn charcoal and sell firewood from the protected forests. However, land owners and group representatives argued that including the communal land as part of the project has allowed the community to negotiate for better alternatives for forest dependent households, especially during dry seasons, reasonably reducing the potential for elite capture of project activities and benefits. Drawing on the project interaction with

the livelihood calendar, enhancing water access and recognising a mix of land ownership were identified as the strategic enablers for the protection of the forests for emission reductions. Other assets such as economic opportunities and land productivity depend more on these strategic assets.

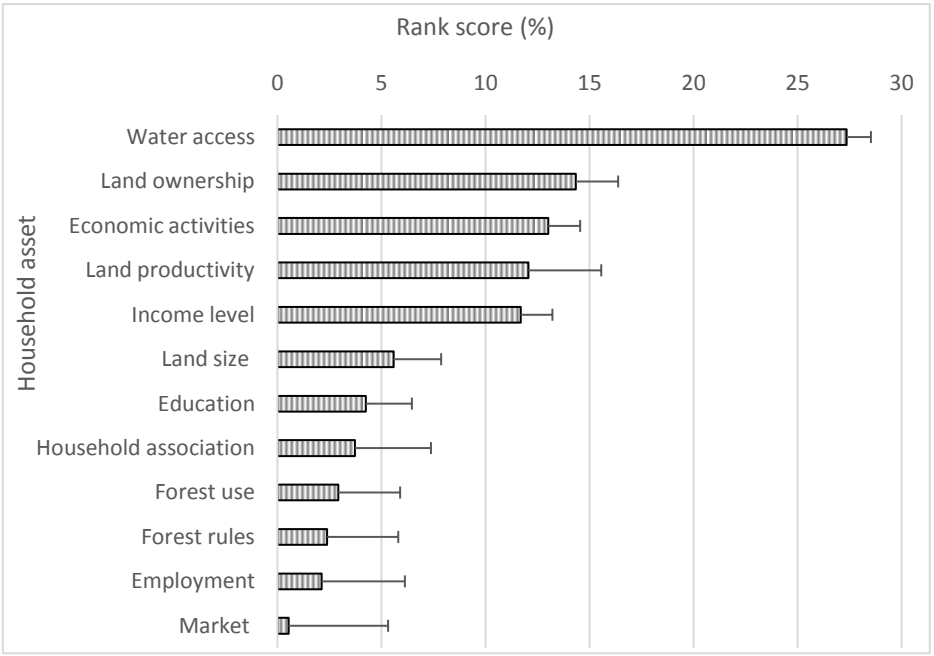

Figure 3: Ranking of the household assets in terms of their influence on the project's activities

3.3. Project impact on household assets (project-impact)

Project staff agreed with community members' decision to allocate a third of carbon revenue to community livelihood projects, including water and bursary. The project-impact scores on the various assets and the associated explanations are contained in Figure 4 and Table 6 respectively. Figure 4 shows that the low-wealth respondents perceived that the project has impacted on most of their assets more positively compared to the middle- and high-wealth respondents. The project impact scores show that the project has impacted positively on most of the low-wealth households' assets (Figure 4), even though these assets mostly impacted on the project negatively (see Figure 2). Low-wealth households perceived that incorporating their communal land as part of the project improved their bargaining power for project benefits and also enabled them to benefit from carbon revenues which they would otherwise forego with their smaller land sizes (Table 6). This contradicts the perception of the high-wealth respondents, who felt that the project's emphasis on

and recognition of communal ownership hinders the sub-division of land into individual parcels or shares as in the ranches. Group representatives, however, emphasised that the project benefits have not adequately matched community expectations or the opportunity costs of protecting the communal forest, and so they expect the project to initiate more alternatives such as irrigated horticulture and poultry projects, among others. The overall project-impact was higher on other assets such as education, employment and membership to a local association. At the control site, households, group representatives and village elders reinforced the view that a REDD+ project may revert ownership and benefits from the state owned Mbololo forests to the community. They claimed that the forested hills currently benefit only a few state officers and businesspeople involved in corruption and illegal logging. The control households, especially the middle-wealth ones, further expressed fears that the project may restrict livestock grazing areas, thereby affecting their economic opportunities.

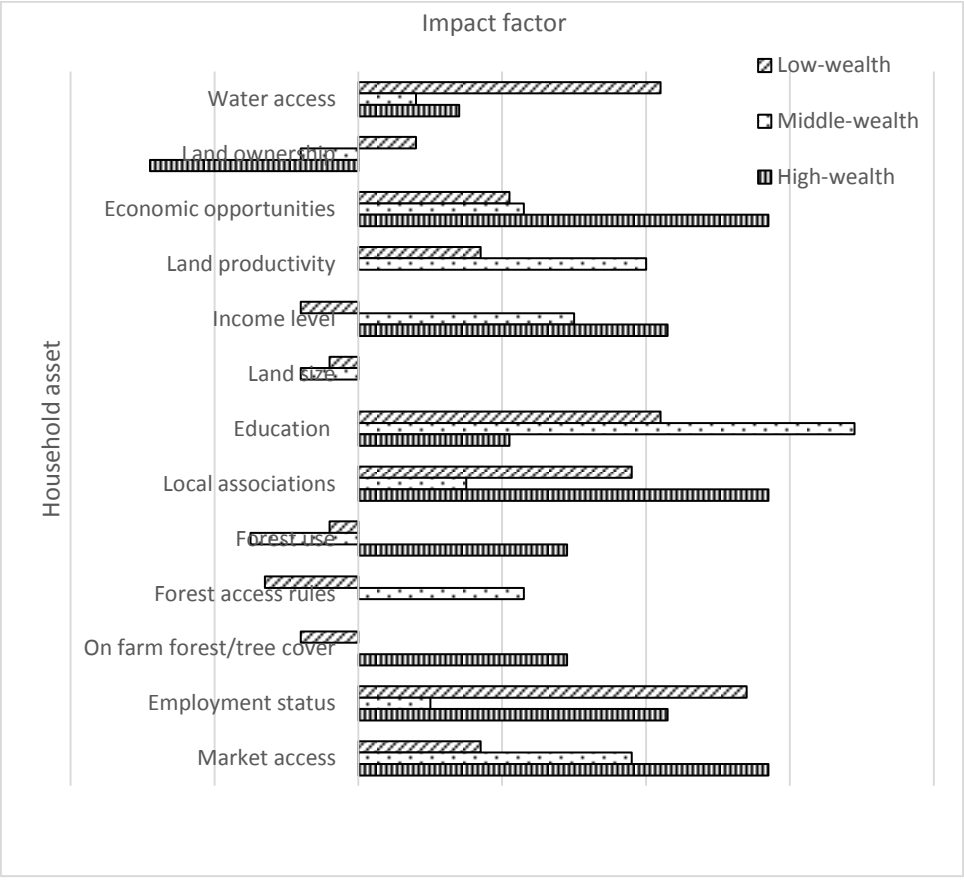

Figure 4: Impact of project activities on household assets

Table 4: Wilcoxon matched pairs signed test for differences between project impacts (intervention) and expected (control)

Household asset	Low-wealth	Middle-wealth	High-wealth	Overall (Mean ± SE)
Water	0.42**	0.08	0.14	0.18**±0.07
Land ownership	0.08	-0.08	-0.29	-0.05±0.10
Economic opportunities	0.21*	0.23	0.57*	0.25*±0.10
Land productivity	0.17*	0.40**	0.00	0.09* ±0.08
Income level	-0.08	0.30**	0.43**	0.11±0.11
Land size	-0.04	-0.08	0.00	-0.05±0.03
Education	0.42**	0.69**	0.21*	0.55**±0.08
Local associations	0.38*	0.15	0.57**	0.34** ±0.09
Forest use	-0.04*	-0.15	0.29	0.05±0.11
Forest access rules	-0.13	0.23*	0.00	0.18* ±0.10
On-farm forest/tree cover	-0.08	0.00	0.29*	0.00*±0.09
Employment status	0.54**	0.23	0.43	0.43**±0.08
Market access	0.17	0.38**	0.57**	0.30* ±0.08
Overall significance in relation to control	**0.756****	**0.686****	**0.538***	

*0.05 , **0.01 Significance in relation to the control (paired t-test)

Table 5: Main impacts of the project on assets. Assets listed in the table include those that were highly ranked as significant to the project.

Asset	Main perceived and actual impacts at the intervention site				Main expected impacts at the control site (Mbololo)		
	Low-wealth	Middle-wealth	High-wealth	*Actual impact*	Low-wealth	Middle-wealth	High-wealth
Water access	(+) Expected construction of water projects	(+) Expected construction of water projects	(+) Protected water sources	*Ksh 3,331,551 (US$39,195) committed to community water projects*	(+) Project to fund water projects and protect forest for rains	(+) Project to fund water projects	(+) Project to fund water projects and protect current Rock Catchment
Land ownership	(+) Strengthens communal land ownership and benefits	(0) No effect	(-) Hinders sub-division of communal land to individual households	*Communal land recognised*	(+) Change of ownership of state land to communal land	(+) Strengthen communal land ownership and benefits	No effect
Land productivity	(+) Expects rains to increase and increase yields (-) Increased number of elephants destroying crops		(+) Expects access to irrigation from the project funded water projects	*25,000 seedlings planted in farmers' fields*	(+) increase in rainfall and water access for better yield (-) protection against elephants destroying crops		(+) Increased yield from project-initiated irrigation facilities
Economic opportunities	(+) Diversified economic activities from project staff and visitors (-) Restricted charcoaling/firewood collection for sale	(+)Diversified economic activities from project staff and visitors (-) Restricted grazing in the ranches	(+)Diversified economic activities from project staff and visitors	*Business and employment opportunities increased (Not quantified)* *Grazing in 400,000 acres ranches prohibited*	(+) Diversified economic opportunities (-) Restricted charcoaling	(-) Restricted grazing in the ranches (+) Sale of tree seedlings and carbon credits	(+) Sale of carbon credits from on-farm trees (+) Business opportunities from project staff
Education	(+) Educational bursaries and school construction	(+) Educational bursaries	(0) No effect – it only targets poor families	*Ksh 5,174,244 (US$60,873) committed to educate 271 secondary school students and 55 college and university students and construct two schools*	(+) Bursaries and school facilities		(+) Bursaries and school facilities (-) Children dropping out of school for project jobs
Employment	(+) Community members employed by the project	(+) Community members employed by the project	(+) Community members employed by the project	*13 staff at the local CBO, 200 casual employees and 100 permanent employees within project activities*	(+) Project to offer jobs	(+) Project to offer jobs	(+) Project to offer self-employment opportunities such as business
Household associations	*(+) Maungu Hills Conservancy and associated groups supported with administrative and activity funds*				(+) Increased activity for local groups		
Forest cover	(+) 25,000 seedlings supplied to households	(+) 25,000 seedlings supplied to households	(+) 25,000 seedlings supplied to households	*2,500 acres of communal hills and over 400,000 acres of dryland forest conserved*	(+) increased protected area under forest	(+) Increased on-farm forest cover	(+) Increased on-farm forest cover

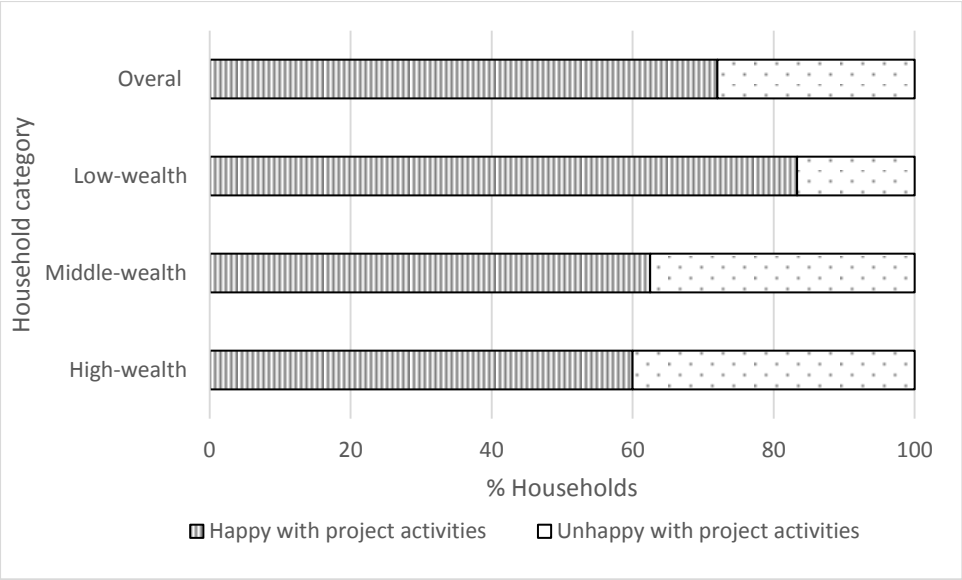

Figure 5: Households' overall perception about the project's activities

3.4. Exploring policy spaces for supporting the enabling assets

While the project has committed part of the carbon revenue to water projects and initiated institutional flexibility in embracing different forest tenure systems, community experiences with the state point to a centralised resource management regime that is non-cognisant of local needs, whether for REDD+ or just people's livelihoods. Project staff and community members blamed bureaucracy within the state water department for delays in initiating the water project funded through the carbon revenue. When asked what the state is doing to support the Kasigau project, the Kenya REDD+ focal point mentioned that the state has little linkage with the Kasigau project because the project is a private entity. Communities further blamed the state for channelling all the revenues from the parks to the central government though the Kenya Wildlife Service, with no share allocated to the community.

The Kenya Wildlife Service staff emphasised the role of the revenues in maintaining the parks and as a national economic pillar of the country. The community therefore perceive the REDD+ project as a better option for governing their resources relative to the state. Project staff thought that including state owned hills or forest at the control site (Mbololo) as part of a REDD+ scheme may be subject to complex negotiations due to the centralisation agenda in state-based resource management. The District Forest Officer argued that REDD+ funds that would result from the hills would be channelled to the state through the Kenya Forest Service (KFS). Consequently, this resource centralisation agenda may hinder the state from putting in place enabling conditions for REDD+ at the local level, and perhaps reflects why

the country's REDD+ readiness plans focus more on administering REDD+ funds than on creating the enabling conditions as the UNFCCC expects.

4.0. Discussion

This study aimed to identify and discuss the enabling assets for REDD+ to achieve mitigation and build local livelihoods in practice. The triangulation of local households and institutional data with communal and expert perspectives reasonably enhanced the validity of the findings of this case study. Lessons highlighted in this study are applicable in Kenya and other sub-Saharan Africa countries involved in REDD+ preparations through similar Forest Carbon Partnership Facility (FCPF) terms of reference (FCPF, FIP and UN-REDD, 2010).

The study context comprises a diversity of wealth structured livelihoods that revolve around water access, land ownership, land productivity and economic opportunities, but from which the project protects a dry land forest for carbon credits and associated benefit sharing. However, water and land ownership were identified as the most strategic assets for the project due to their role in successful agricultural livelihoods and economic opportunities for different social groups within the community, and especially for the poor, who posit a greater threat to protected forests.

Water scarcity is responsible for failure in the rain-fed agriculture that provides the low-wealth households with food and income. Many poorer households depend on the forest when crops fail due to poor rains. Their reliance on charcoal as an income generating activity compromises REDD+ carbon objectives through leakage. Water scarcity linked to drought is reportedly the greatest form of vulnerability for forest ecosystems, and more so those targeted for REDD+ (Nkem et al. 2012; FAO 2010). Even within Kenya, case studies indicate that forest invasion for slash and burn and charcoal occurs mainly during dry seasons when farming communities cannot access water either for rain-fed cropping or irrigation (Thenya and Kiama 2008). Water scarcity also hampers households' participation in REDD+ related activities because women spend many hours searching and queuing for water and looking for wage labour opportunities rather than attending to activities such as on-farm agroforestry practices. Such on-farm agroforestry practices are key to the success of

REDD+, especially as an alternative source of fuelwood and timber in situations where forest access are restricted for carbon like the Kasigau case (Minang et al. 2011).

Land tenure is vitally important for the project and it is in the interest of various groups within the Kasigau community, especially the low-wealth groups, that the REDD+ project recognises the mix of land tenure systems in the area. The Kasigau area encompasses a diverse set of land tenure regimes, ranging from communal land, trust land, private ranches and even individual land, all of which have a bearing on the project activities and for different wealth groups. While the high-wealth households prefer that the project works with private tenure, the low-wealth households prefer communal tenure. The majority of the low-wealth households, due to the small land parcels that they hold under customary rights, utilise the communal forests as a source of basic livelihood goods such as fuelwood and even charcoal for income, especially during years of agricultural crop failure. Including these communal lands and forests as part of the REDD+ project has reshuffled their livelihoods. Recognising communal land meant that their (typically poorer) residents are also entitled to REDD+ benefits that they would otherwise miss through individualised systems. This value on communal forest for the low-wealth households – the majority of the Kasigau people – is reflected in studies that emphasise possible difficulties in achieving REDD+ goals without recognising community controlled forests, which currently constitute about 25% of developing country's forests (see Bluffstone et al. 2013; Chhatre and Agrawal 2009). Recognising communal tenure and protecting such for carbon also means that REDD+ alternatives must correspond to lost livelihood opportunities. For the Kasigau people, lack of such alternatives drives them to illegally encroach the forest for charcoal and other goods they have long accessed, and this is a recipe for carbon leakage in projects (see Wunder et al. 2008), social conflicts, protests and overall project failure (Staddon 2009). Communal land tenure further simplifies negotiations for REDD+ and is cost-effective in terms of time and resources (Atela 2013).

The water access and land ownership are key assets for the REDD+ project, driving pro-poor livelihoods and economic opportunities and thereby influencing the direction of deforestation. This adds further evidence explaining why such pro-poor livelihood

assets should be addressed if REDD+ and related forestry carbon projects are to succeed locally (Boyd 2007; Smith and Scherr 2003).

The Kasigau project has attempted to recognise various forms of land ownership and to support water projects alongside other livelihood assets such as education and employment. The project has channelled substantial carbon revenue (US$39,195) to communal water and other livelihood assets. This is significant to the low-wealth households, who lack irrigation water even for their home gardens and often walk longer distances to access water. When compared to the control site, the perceived project impact on water is significant. The Project's impact on land ownership was however not significant, despite its flexibility in engaging different forms of tenure systems. This may be because the project has no legislative power to re-enforce preferred tenure systems and cannot control certain ongoing state-based land reforms tailored towards individualised systems, an approach which may complicate negotiations for land and carbon rights. On the other hand, the expected potential for REDD+ to revert ownership and benefits from state-managed hills and forest to the community mean that a REDD+ project is not only expected to reduce emissions and secure livelihoods, but to also become a landscape programme that could mainstream resource governance to benefit the poor in local communities. This case further shows that a communal approach to engagement and benefit sharing, as in the case of land and water initiatives in REDD+, enhances equity in local resource governance. Other case studies of the Noel Kempff Mercado Climate Action Project (NKMCAP) in Bolivia (Boyd et al. 2007), the Forest Carbon Trust Project in Nepal (Maraseni et al. 2014) and the Kenya Agricultural Carbon Project (Atela 2012) support this fact that attending to pro-poor livelihood strategies provides greater local participation in and acceptance of REDD+ projects.

Supporting livelihood assets is a responsibility of the state as well (UNFCCC 2012; Peskett et al. 2011). However, this study highlights that bureaucracy and corruption within state agencies and poor linkage with private sectors currently impede support for the local enablers of REDD+. This partly coincides with the assertion of the REDD+ focal point for Kenya that the state has little role in private REDD+ entities because they operate with their own funds, and so it is not surprising that Kenya's REDD+ plan, (GoK, 2010), puts more emphasis on administrative structures rather

than partnerships towards addressing the REDD+ enablers (Bernard et al. forthcoming). The poor partnership with non-state actors and institutional support for REDD+ at the local level is reportedly common in most developing countries (Ngendakumana et al. 2014; Mustalahti et al. 2013; Cerbu et al. 2011) even though the private (and other) actors are reportedly committed to be being part of the REDD+ process. Overall, the state institutional gaps in REDD+ preparation and poor support for local assets raise concerns as to whether the state can ably oversee the implementation of REDD+ as assumed by the international community. As such, there is need to re-think the role of the state in REDD+ if we consider that the UNFCCC negotiations have obliged the state to monitor, support and connect sub-national REDD+ initiatives into national level reporting (decision 2/COP16) and to support enabling conditions for sub-national projects (COP17; UNFCCC 2011).

5.0. Conclusion

This study reveals that enabling factors for REDD+ at the local level are subject to the livelihood interests of various wealth groups. Overall, water access and integrated land tenure are the strategic enablers for REDD+ due to their close links with livelihoods and their knock-on effects on other assets that are equally crucial for a REDD+ project. The study shows that REDD+ projects are likely to succeed if they support these assets as part of pro-poor livelihood initiatives at the local level. Pro-poor support enables a project to be accepted locally, operate sustainably and deliver the global goals of mitigation and spurring adaptations in line with UNFCCC expectations. More inclusive approaches to engagement and benefit sharing are key pro-poor strategies that projects can adopt to further streamline resource governance in particular developing contexts where states have excluded the local people from managing and benefiting from the local forest resources.

There remains a need for closer partnership between state actors and the private sector at all stages of REDD+. This is vital because certain local enablers, such as legalising tenure regimes for REDD+, depend on state institutions and are beyond the institutional scope of sub-national projects. So while projects proposed by the private sector may have the resources and the will to address the local enablers, political goodwill and support from the national governments is key in actualising the

private sector potential in REDD+. Project developers and states can apply findings such as those presented here to design cost-effective and suitable mitigation options relevant for smallholders' livelihood needs.

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7.0. References

Angelsen, A., Larsen, H., Lund, J., Smith-Hall, C. and Wunder, S. (eds) (2011) *Measuring Livelihoods and Environmental Dependence: Methods for Research Fieldwork,* London, UK: Earthscan

Angelsen, A. and Wertz-Kanounnikoff, S. (2008) 'What are the Key Design Issues for REDD+ and the Criteria for Assessing Options?' in Angelsen, A. (ed) *Moving Ahead With REDD+: Issues, Options and Implications*, Bogor, Indonesia: Center for International Forestry Research

Angelsen, A. and Wunder, S. (2003) *Exploring the Forest-Poverty Link: Key Concepts, Issues and Research Implications*, CIFOR Occasional Paper No. 40, Bogor, Indonesia: Center for International Forestry Research

Asquith, N.M., Vargas Ríos, M.T. and Smith, J. (2002) 'Can Forest-Protection Carbon Projects Improve Rural Livelihoods? Analysis of the Noel Kempff Mercado Climate Action Project, Bolivia', *Mitigation and Adaptation Strategies for Global Change*, 7:323-337

Atela, J. (2012) *The Politics of Agricultural Carbon Finance: The Case of the Kenya Agricultural Carbon Project*. STEPS Working Paper 49, Brighton, UK: Steps Centre

Atela, J. (2013) Governing REDD+: *Global Framings versus Practical Evidence from the Kasigau Corridor REDD+ Project, Kenya.* STEPS Working Paper 55, Brighton, UK: STEPS Centre

Atela, J., Queen, C. and Minang, P. (2014) Are REDD+ Projects Pro-Poor in their Spatial Targeting? Evidence from Kenya. A Case Study of Kenya*. Applied Geography,* 52**:** 14-24.

Bedford, T. and Burgess, J. (2001) 'The Focus-Group Experience', in Limb, M. and Dwyer, C. (eds), *Qualitative Methodologies For Geographers,* London, UK: Arnold

Bernard, F., Minang, P., Adkins, B. and J., F. (forthcoming) 'REDD+ Projects and National-Level Readiness Processes: A Case Study from Kenya', *Climate Policy*

Blom, B., Sunderland, T. and Murdiyarso, D. (2010) 'Getting REDD+ to Work Locally: Lessons Learned from Integrated Conservation and Development Projects', *Environmental Science and Policy*, 13:164-172

Bluffstone, R., Robinson, E. and Guthiga, P. (2013) 'REDD+ and Community-Controlled Forests in Low-Income Countries: Any Hope for a Linkage?', *Ecological Economics*, 87:43-52

Bond, I., Grieg-Gran, M., Wertz-Kanounnikoff, S., Hazlewood, P., Wunder, S. and Angelsen, A. (2009) *Incentives to Sustain Forest Ecosystem Services: A Review and Lessons for REDD*+. Natural Resource Issues No. 16, London, UK: International Institute for Environment and Development, with Center for International Forestry Research, Bogor, Indonesia and World Resources Institute, Washington DC

Boyd, E., May, P., Chang, M. and Veiga, F.C. (2007) 'Exploring Socioeconomic Impacts of Forest Based Mitigation Projects: Lessons from Brazil and Bolivia', *Environmental Science & Policy*, 10:419-433

Brooks, N., Neil Adger, W. and Mick Kelly, P. (2005) 'The Determinants of Vulnerability and Adaptive Capacity at the National Level and the Implications for Adaptation', *Global Environmental Change,* 15:151-163

Brown, H.C.P., Smit, B., Sonwa, D.J., Somorin, O.A. and Nkem, J. (2011) 'Institutional Perceptions of Opportunities and Challenges of REDD+ In the Congo Basin', *The Journal of Environment & Development*, 20:381-404

Caplow, S., Jagger, P., Lawlor, K. and Sills, E. (2011) 'Evaluating Land Use and Livelihood Impacts of Early Forest Carbon Projects: Lessons for Learning about REDD+', *Environmental Science & Policy*, 14:152-167

CIFOR (2014) *Global REDD+ Projects Map,* Bogor, Indonesia: Center for International Forestry Research / http://www.forestclimatechange.org/redd+-map/

Chambers, R. (1981) 'Rapid Rural Appraisal: Rationale and Repertoire,' *Public Administration and Development*, 1:95-106

Chhatre, A., Lakhanpal, S., Larson, A.M., Nelson, F., Ojha, H. and Rao, J. (2012) 'Social Safeguards and Co-Benefits in REDD+: A Review of the Adjacent Possible', *Current Opinion in Environmental Sustainability*, 4:654-660

Chhatre, A. and Agrawal, A. (2009) 'Trade-offs and Synergies between Carbon Storage and Livelihood Benefits from Forest Commons', *Proceedings of the National Academy of Sciences*, 106:17667-17670

Corbin, J. and Strauss, A. (1990) 'Grounded Theory Research: Procedures, Canons, and Evaluative Criteria', *Qualitative Sociology*, 13:3-213

Corbera, E. and Schroeder, H. (2011) 'Governing and Implementing REDD+', *Environmental Science & Policy*, 14:89-99

Dyer, J., Stringer, L.C., Dougill, A.J., Leventon, J., Nshimbi, M., Chama, F., Kafwifwi, A., Muledi, J.I., Kaumbu, J.M.K., Falcao, M., Muhorro, S., Munyemba, F., Kalaba, G.M. and Syampungani, S. (2014) 'Assessing Participatory Practices in Community-Based Natural Resource Management: Experiences in Community Engagement from Southern Africa', *Journal of Environmental Management*, 137:137-145

FAO (2010) *Forest Resources Assessment: Key Findings*, Rome, Italy: Food and Agriculture Organization

FCPF, FIP and UN-REDD+ (2010) *Enhancing Cooperation and Coherence Among Multilateral REDD+ Institutions to Support REDD+ Activities*, Washington DC: Forest Carbon Partnership Facility, Forest Investment Program and UN-REDD+ Program

Gibbs, H., Brown, S., Niles, J. & Foley, J. (2007) Monitoring and estimating tropical forest carbon stocks: making REDD a reality. *Environ. Res. Lett.,* 2**,** 13

Government of Kenya (2010) *Revised REDD+ Readiness Preparation Proposal,* Nairobi, Kenya: Government Printer

Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., Van Den Brink, M., Jong, P., Nooteboom, S. and Bergsma, E. (2010) 'The Adaptive Capacity Wheel: A Method to Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society', *Environmental Science & Policy*, 13:459-471

Hashmiu, I. (2012) *Carbon Offsets and Agricultural Livelihoods: Lessons Learned From a Carbon Credit Project in the Transition Zone of Ghana.* STEPS Working Paper 50, Brighton, UK: STEPS Centre

IPCC (2007) *Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press

Jagger, P., Atmadja, S., Pattanayak, S.K., Sills, E. and Sunderlin, W.D. (2009) 'Learning While Doing: Evaluating Impacts of REDD+ Projects', in Angelsen, A. (ed), *Realising REDD+: National Strategy and Policy Options,* Bogor, Indonesia: Center for International Forestry Research

Jagger, P., Sills, E.O., Lawlor, K. and Sunderlin, W.D. (2010) *A Guide to Learning About Livelihood Impacts of REDD+ Projects*. Occasional Paper No 56, Bogor, Indonesia: Center for International Forestry Research

Jindal, R., Swallow, B. and Kerr, J. (2008) 'Forestry-Based Carbon Sequestration Projects in Africa: Potential Benefits and Challenges', *Natural Resources Forum*, 32:116-130

Jindal, R. (2010) 'Livelihood Impacts of Payments for Forest Carbon Services: Field Evidence from Mozambique', in Tacconi, L., Mahanty, S. and Suich, H. (eds), *Payments for Environmental Services, Forest Conservation and Climate Change: Livelihoods in the REDD+?*, Cheltenham, UK: Edward Elgar Publishing

Jolliffe, I. (2005) 'Principal Component Analysis', *Encyclopedia of Statistics in Behavioural Science*

Kalaba, F., Quinn, C. and Dougill, A. (2013) 'Contribution of Forest Provisioning Ecosystem Services to Rural Livelihoods in the Miombo Woodlands of Zambia', *Population and Environment*, 35(2):159-182

Kenya National Bureau of Statistics (2007) *Kenya Integrated Household Budget Survey 2005/2006*, Nairobi, Kenya: Government Printer

Kjaer, A. (2004) *Governance: Key Concepts,* Cambridge, UK: Polity Press

Maraseni, T.N., Neupane, P.R., Lopez-Casero, F. and Cadman, T. (2014) 'An Assessment of the Impacts of the REDD+ Pilot Project on Community Forests User Groups (CFUGs) and their Community Forests in Nepal', *Journal of Environmental Management*, 136:37-46

Mbow, C., Skole, D., Dieng, M., Justice, C., Kwesha, D., Mane, L., El-Gamri, M., Vordzogbe, V. and Virji, H. (2012) *Challenges and Prospects for REDD+ in Africa: Desk Review of REDD+ Implementation in Africa*. Report No 3, Copenhagen, Denmark: Global Land Project

Minang, P.A., Bressers, H., Skutsch, M. and McCall, M. (2007) 'National Forest Policy as a Platform for Biosphere Carbon Management: The Case of Community Forestry in Cameroon', *Environmental Science and Policy*, 10:204-218

Minang, P.A., Bernard, F., Van Noordwijk, M. and Kahurani, E. (2011) *Agroforestry in REDD+: Opportunities and Challenges*. ASB Policy Brief No. 26, Nairobi, Kenya: ASB Partnership for the Tropical Forest Margins

Minang, P.A., Van Noordwijk, M., A., D. L., Alemagi, D., Do, T.H., Agung, P., Bernard, F., Robiglio, V., Alemagi, D., Catacutan, D., Suyanto, C., Armas, A., Silva, B., Feudjio, M., Galudra, G., Retno, M., White, D., Kahurani, E., Widayati, A., Namirembe, S. and Leimona, B. (forthcoming) 'REDD+ Readiness Progress Across Countries: Time for Reconsideration', *Climate Policy*

Mustalahti, I., Bolin, A., Boyd, E. and Paavola, J. (2012) 'Can REDD+ Reconcile Local Priorities and Needs with Global Mitigation Benefits? Lessons from Angai Forest, Tanzania', *Ecology and Society*, 17(1):14-125

Mustalahti, I. Rantala, S., Kontinen, T. and Korhonen-Kurki, K. (2013) *'Equity' and Institutional Logics in REDD+ Tanzania*, a paper presented at the Fourteenth Biennial Conference of the International Association for the Study of the Commons, June 3-7, Mt. Fuji, Japan / http://hdl.handle.net/10535/8938

Nkem, J., Somorin, O., Jum, C., Idinoba, M., Bele, Y. and Sonwa, D. (2012) 'Profiling Climate Change Vulnerability of Forest Indigenous Communities in the Congo Basin', *Mitigation and Adaptation Strategies for Global Change*, 18(5):513-533

Peskett, L. and Brockhaus, M. (2008) 'When REDD+ Goes National: A Review of Realities, Opportunities and Challenges', in Angelsen, A. (ed), *Moving Ahead with REDD+: Issues, Options and Implications,* Bogor, Indonesia: Center for International Forestry Research

Peskett, L., Schreckenberg, K. and Brown, J. (2011) 'Institutional Approaches for Carbon Financing in the Forest Sector: Learning Lessons for REDD+ from Forest Carbon Projects in Uganda', *Environmental Science and Policy*, 14(2):216-229

Peters-Stanley, M., Gonzalez, G. and Yin, D. (2013) *Covering New Ground: State of the Forest Carbon Markets 2013*, Washington DC: Ecosystem Marketplace

Richards, M. and Panfil, S. (2010) *Manual for Social Impact Assessment of Land-Based Carbon Projects*. Version 1.0. Forest Trends, Washington DC: Climate Community Biodiversity Alliance, Fauna and Flora International and Rainforest Alliance

Robertson, N. and Wunder, S. (2005) *Fresh Tracks in the Forest: Assessing Incipient Payments for Environmental Services Initiatives in Bolivia,* Bogor, Indonesia: Center for International Forestry Research

Schreckenberg, K., Camargo, I., Withnall, K., Corrigan, C., Franks, P., Roe, D., Scherl, L. and Richardson, V. (2010) *Social Assessment of Protected Areas: A Review of Rapid Methodologies*, a report for the Social Assessment of Protected Areas Initiative, London, UK: International Institute for Environment and Development

Schroeder, H. (2010) 'Agency in International Climate Negotiations: The Case of Indigenous Peoples and Avoided Deforestation', *International Environmental Agreements: Politics, Law and Economics,* 10:317-332

Scoones, I. (1998) *Sustainable Rural Livelihoods: A Framework for Analysis.* IDS Working Paper No. 72, Brighton, UK: Institute of Development Studies, University of Sussex

Shackleton, C.M., Shackleton, S.E., Buiten, E. and Bird, N. (2007) 'The Importance of Dry Woodlands and Forests in Rural Livelihoods and Poverty Alleviation in South Africa', *Forest Policy and Economics,* 9:558-577

Sikor, T., Stahl, J., Enters, T., Ribot, J.C., Singh, N., Sunderlin, W.D. and Wollenberg, L. (2010) 'REDD-Plus, Forest People's Rights and Nested Climate Governance', *Global Environmental Change*, 20:423-425

Sills, E., Madeira, E., Sunderlin, W. and Wertz-Kanounnikoff, S. (2009) 'The Evolving Landscape of REDD+ Projects', in Angelsen, A. (ed), *Realising REDD+ National Strategy and Policy Options*, Bogor, Indonesia: Center for International Forestry Research

Skutsch, M. and McCall, M. (2010) 'Reassessing REDD+: Governance, Markets and the Hype Cycle', *Climatic Change*, 100:395-402

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

Staddon, S. 2009. 'Carbon Financing and Community Forestry: A Review of the Questions, Challenges and the Case of Nepal', *Journal of Forest and Livelihood*, 8:25-32

Stern, N. (2006) *The Economics of Climate Change: The Stern Review*, Cambridge, UK: Cambridge

Thenya, T. and Kiama, S. (2008) *Socio-Economic Survey and Livelihood Analysis of the Maasai Mau Ecosystems*, Technical Series, Kenya Forest Working Group, Nairobi, Kenya

UNFCCC (2011) *Report of the Conference of the Parties on its Seventeenth Session, Held in Durban from 28 November to 11 December 2011*. FCCC/CP/2011/9/Add.1, UNFCC, Bonn

UNFCCC (2010) *Report of the Conference of the Parties, sixteenth session, 29 November - 10 December 2010,* Cancun. FCCC/CP/2010/7, UNFCC, Bonn

UNFCCC (2009) *The Copenhagen Accord: Report of the Conference of the Parties on its Fifteenth session held in Copenhagen, 7 - 18 December 2009,* FCCC/CP/2009/L.7, UNFCC, Bonn

Van Vliet, N. (2010) 'Participatory Vulnerability Assessment in the Context of Conservation and Development Projects: A Case Study of Local Communities in Southwest Cameroon', *Ecology and Society,* 15(2)1-12

Vincent, K. (2007) 'Uncertainty in Adaptive Capacity and the Importance of Scale', *Global Environmental Change*, 17:12-24

Wildlife Works (2011) *The Kasigau Corridor REDD+ Project, Phase I – Rukinga Sanctuary Project Document (PD) for Validation using the Voluntary Carbon Standard (VCS) 2007.1 / Sectoral Scope 14 VM0009 Methodology for Avoided Mosaic Deforestation of Tropical Forests, Version 9,* Rukinga, Kenya: Wildlife Works,

World Bank (2009) Forest *Carbon Partnership Facility: FY2009 Annual Report*, Washington DC: The World Bank, Carbon Finance Unit

World Bank (2011) *Biocarbon Fund Experience: Insights from Afforestation and Reforestation Clean Development Mechanism Projects*, Washington, DC: The World Bank

Wunder, S. and Albán, M. (2008) 'Decentralized Payments for Environmental Services: The Cases of Pimampiro and Profafor in Ecuador', *Ecological Economics,* 65:685-698

Wunder, S. (2001) 'Poverty Alleviation and Tropical Forests: What Scope for Synergies?', *World Development*, 29:1817-1833

Mathur, V., Afionis, S., Paavola, J., Dougill, A.J., Stringer, L.C. (2014). Experiences of host communities with carbon market projects: towards multi-level climate justice. Climate Policy, 14(1): 42-62

Appendix 1: Main livelihood assets owned by different households belonging to different wealth groups. Chi square test was used to test for the significant differences in asset composition between different wealth categories.

		Main/dominant asset composition by wealth			Main/dominant asset composition by wealth		
Asset category		Low (n=24)	Middle (n=16)	High (n=10)	Low (n=24)	Middle (n=16)	High (n=10)
Social	Age	21-71	21-71	21-71	26-78	26-78	26-78*
	Gender of h. head (majority)	Female	Female	Male*	Female	Male	Female
	Household size (mean)	7	6	6	6	5	4*
	Main livelihood activity (majority)	Farming	Business	Business*	Farming	Farming	Business
	Main shocks (majority)	Drought	Drought	Death*	Drought	Drought	Death*
	Main coping strategy (majority)	Food for work	Remittance	Business*	Casual labour	Casual labour	Remittance*
	Causes of crop failure (majority)	Drought	Drought	Drought	Drought	Drought	Drought
	Number of associations (mean)	0	1	2*	1	1	2*
	Association scope (level)	Local	Local	Sub-national	Local	Local	Sub national
Natural	Forest type owned	Communal hill	Communal hill	Ranches	None	Ranches	Ranches
	Land size (acres)	1-2	1-4	4-10*	1-2	2-4	4-8*
	Land acquisition (majority)	Inheritance	Inheritance	Inheritance	Inheritance	Inheritance	Inheritance
	Proof of land ownership (majority)	Elders' consent	Allot. letter	Allot. Letter*	Allot. letter	Title deed	Title deed*
	Crop yields (mean bags/acre)	2.01	2.13	2	2.52	2.81	2.78
	Yield consumption period (mean months)	3	3	6*	2	3	5*
	Main forest uses (majority)	Fuel wood	Fuel wood	Cultural*	Fuel wood	Fuel wood	Cultural*
Financial	Number of secondary income sources (mean)	0	1	2*	0	1	2*
	Main Expenditure (majority)	Food	Food	Food	Food	Food	Food
	Number of cows (mean)	1	1	4	1	1	3*
	Number of goats (mean)	2	4	7*	2	2	5*
	Number of hens (mean)	2	5	18*	3	20	20*
Human	Education level (majority)	Primary	Primary	Secondary*	Primary	Primary	Secondary*
	Main employment type (majority)	Casual	Casual	Permanent*	Casual	Casual	Permanent*
Physical	Water access distance (km)	2-5	1-2	1-2*	2-5	1-2	1-2*
	Market value to the households (majority)	Buying	Buying	Selling*	Buying	Buying	Both
	Distance to the nearby road (km)	1-2	1-2	1-2	1-2	1-2	1-2