

Community Monitoring of Forest Carbon Stocks and Safeguards Tracking in Kenya: Design and Implementation Considerations

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Received 25 February 2015; accepted 16 April 2015; published 21 April 2015

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Abstract

This paper investigates modalities required to design and implement community monitoring of forest carbon stock changes and safeguards implementation in Kenya. General principles and elements were drawn from the UNFCCC REDD+ policy frameworks for developing modalities and procedures for designing community forest monitoring system. The paper utilised policy analysis approach used to derive monitoring goals and objectives by assessing the compatibility of Kenya's policy and legislative framework with monitoring elements provided in the UNFCCC REDD+ policy mechanism. The elements included monitoring goals, objectives, questions, indicators, and methods and tools. Two goals were identified which included, reduction of forest carbon emissions (ER) and monitoring of multiple social and environmental safeguards (SG). Five ER related objectives were identified to include: forest reference emission levels or forest reference levels, drivers of deforestation and forest degradation, Land use activities, eligible ER actions and estimation of forest emissions. Six objectives guiding SG were identified to include: policy, governance, human rights, socio-economic, biodiversity and environmental concerns. Corresponding questions to the goals and objectives were systematically designed. In turns, indicators, depicting quantitative and

qualitative measurements, which best provided answers to questions were identified. The various methods and tools used by communities around the world in providing data and information required to satisfy the indicators were identified through literature review. The review identified four methods and tools that included: Remote Sensing and GIS, GPS survey, smartphone survey and Ground truthing. Smartphone and cloud-based server technology were found to be the recent emergent tools in aiding community monitoring of REDD+ projects. The paper argues that local communities and indigenous peoples have the capability and capacity to monitor and undertake forest carbon monitoring and tracking of implementation of safeguards if supported with relevant training; compensated for the time, labour and knowledge they contribute to the process; provided with feedback and involved decision making process.

Keywords

REDD+ Policy Mechanism, Community Monitoring, Forest Carbon Stock, Safeguards, Incentivizing Communities

1. Introduction

The REDD+ mechanism is aimed at reduction of greenhouse gas emission from the biosphere while realizing additional environmental and social benefits for developing countries (UN, 2010). The mechanism is aimed at delivering both carbon and non-carbon related benefits to all relevant stakeholders.

The UNFCCC, through decisions 1/CP.16 par. 73 and 2/CP.17 par. 64 affirmed that for developing countries desirous of undertaking REDD+ result-based actions to receive market-based finances, the actions must be fully measured, reported and verified (MRV) (UN, 2011, 2010). Guidance for assessing the performance of REDD+ actions requires the establishment of two performance assessment elements: 1) a Forest Monitoring System (FMS) for monitoring and reporting on emissions reductions or emission removals, and displacement of emissions established through a series of 8 interrelated steps (Figure 1), and 2) a safeguard information system to track how various environmental, socio-economic and policy safeguards, are observed and respected, (Figure 2) (decision 1/CP.16, paragraph 71 (c) and (d) (UN, 2010).

The UNFCCC requires developing countries, by decision 1/CP.15 par. 1 (d) (i) (2009) and decision 1/CP.16 part (III) (C) par. 71 (c) (2010), to establish robust and transparent national forest monitoring systems that utilises a combination of remote sensing and ground-based forest carbon inventory technologies for estimating forest carbon stocks, forest carbon changes and forest area changes.

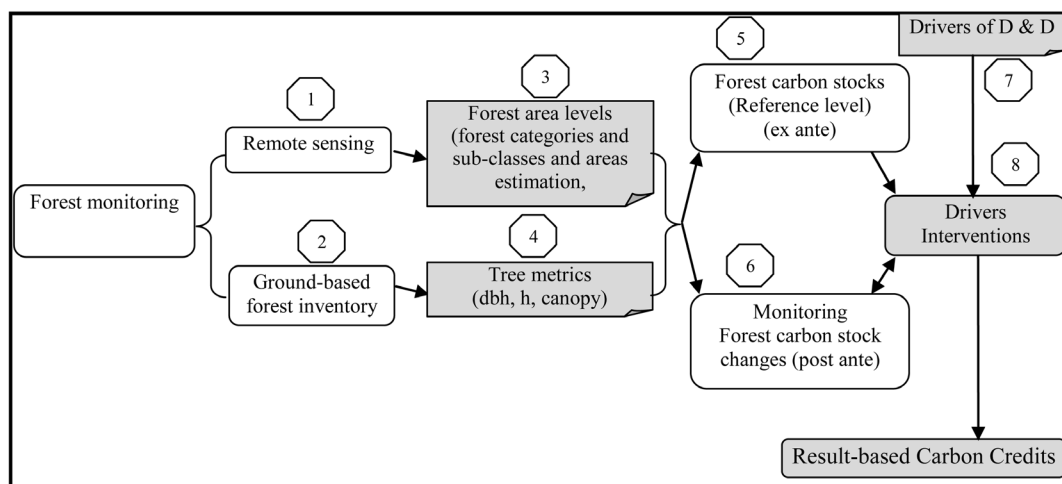


Figure 1. Schematic illustration of Forest carbon stock monitoring process. Derived from literature review. Muchemi J.G, 2014.

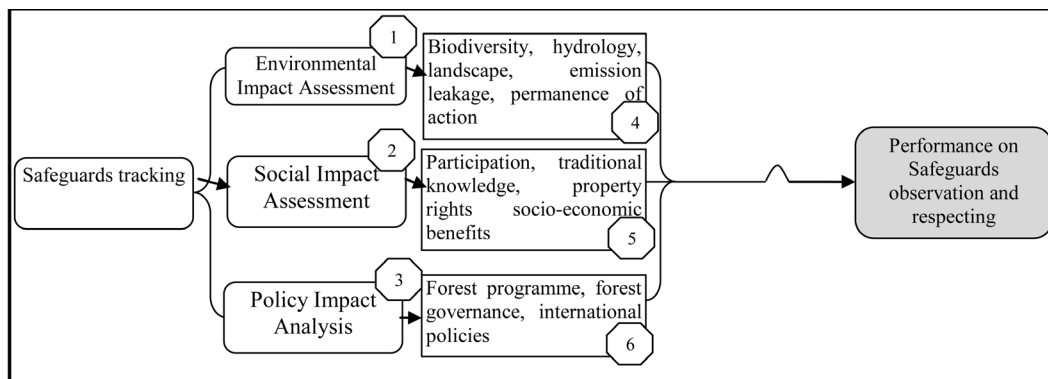


Figure 2. Schematic illustration of Safeguards monitoring process. Derived from literature review: Muchemi J.G 2014.

In addition, the UNFCCC require parties, through decision 1/CP.16, to promote and support implementation of safeguards and develop a system for providing information on how they are addressed and respected. The key safeguards could be categorised into policies and legislation, governance, human rights, and social and environmental benefits.

Further, the UNFCCC (2009), through decision 4/CP.15 par. 4, has encouraged all its parties to support and strengthen the **capacities of developing countries** to collect and access, analyze and interpret data in order to develop emission estimates.

The UNFCCC, (2009, 2010 (mention the decision here)) has provided guidance that developing countries establish a REDD+ MRV system at national and/or sub-national levels. This paper argues that the process of collecting data on forest carbon changes and information on safeguards should be jointly conducted by the national forest agency with active, positive participation of other stakeholders including forest dependent communities. The data and information collected would then be transmitted to the national level and eventually packaged for reporting to the UNFCCC (Felipe et al. 2013, Broadhead et al. 2013, Muchemi, 2014). The paper presents a conceptual framework depicting basic ideas, design, plans and strategies critical in integrating community carbon monitoring Kenya.

2. Rationale for Community Participation in Monitoring

Community engagement in monitoring (CFM—community forest monitoring) has two sets of highly significant benefits. Firstly, involving communities provide an opportunity to access local information which may be difficult or impossible for forest officers who come from outside the forest area. Communities have intimate and historical associations with their local environment, including forest resources, as well as a deeper understanding of local social and cultural factors which are of key importance to types and quality of management forest. In addition, they can provide an early warning system of ecological changes. Community in various forest sites around the country can provide an extensive monitoring network than the thinly distributed government forest officers, thus leading to higher efficiency because the operational costs can be much lower (Larrazabal et al. 2012, McCall 2011, Knowles et al. 2010, Danielsen et al. 2010; Kennet, 1999).

Secondly, there is the potential of enhancing social capital, ownership and empowerment of communities; promoting greater efficiency in forestry actions and more accountability and transparency in benefit sharing; and genuinely and sustainably shifting power from government to communities, thus promoting their inclusion and input in decision making processes (Dorsner, 2004; Chambers, 1995; Kennedy, 1999).

Noting that, communities are not homogenous entities, but rather consist of multiple social entities with varied governance structures and livelihood strategies defined by specific norms and values (Cleaver 2001, Chambers, 1983: 18; Kyessi 2002; Villar-Singh, 1999; Korten, 1981), and opportunities to access benefits and capacity to defend their interests and rights over forest resources, the UNFCCC, in recognition of this diversity, specifically identified indigenous peoples' and local communities (UN, 2007, 2009, 2010).

3. Designing a Community Monitoring Framework

The UNFCCC encourages developing countries to develop guidance for effective engagement of indigenous

peoples and local communities in monitoring and reporting (UNFCCC Decision 4/CP.15 par. 3). The guidance would detail collection, access, analysis, and interpretation of data, in order to develop estimates for forest carbon stocks changes (UNFCCC Decision 4/CP.15 par. 4). In addition, both the “Cancun Agreement” adopted in CoP, 16, (UN, 2010) and “Durban platform” developed in CoP 18, (2011) stressed the need for full and effective engaging indigenous and local communities when implementing national strategies, action plans and REDD+ activities (Decision 1/CP.16 Appendix 1; (Decision 12/CP.17 section I, para 1-6). Noting the complexity of developing monitoring systems, the Cancun Agreement provided that implementation of REDD+ activities provide transparent, consistent and regularly up-dated information accessible by all relevant stakeholders; be transparent and flexible to allow for improvement over time; provide information on how all the safeguards are being addressed and respected; be country-driven and implemented at national level; and build on existing systems, as appropriate.

Despite these provisions, to date no specific guidelines have been developed with respect to community monitoring. Instead, the UNFCCC has limited the monitoring as a national discourse, perhaps to allow guidance on community monitoring to be developed by respective countries based on their national circumstances and capabilities. Nevertheless, these national guidances form a critical consideration when designing, developing and implementing guidance on community monitoring.

The national level guidance on forest reference emissions levels was finalized in November, 2013 (UN, 2014) and adopted in CoP 19 as “Warsaw Framework” through UNFCCC decision 11-15/CP.19 while guidance on systems for providing information on how all the safeguards are being addressed and respected was in November, 2014 (UN, 2014) as per SBSTA 14 which are expected to be presented to CoP 20 for discussion and appropriate adoption or further consideration. The “Warsaw Framework” provides general guidance on national communication reporting that requires timing, frequency and channel of communication for submitting summaries of information. In addition, framework requires that countries provide via the UNFCCC web platform, national communications on emissions reduction levels, assessed reference level(s), a link to the national strategy or action plan and information on the national forest monitoring system. Further, they should provide, with a voluntary provision option, periodic summaries on about how all the safeguards are being addressed and respected, throughout the implementation of REDD+ activities, *before they can receive results-based payments*”.

Notably, based on the six sets of submissions made to the SBSTA by 6 November 2014, the development of systems for providing information on how safeguards are observed and respected is faced by several challenges. These challenges related to lack of the following: 1) a common understanding and definition on safeguards among developing countries; 2) a guide for setting up an SIS; 3) resources for the development and implementation of SIS; 4) elements for safeguards information sharing among stakeholders; 5) clarity on the elements needed to be shared at the Convention level; 6) modalities for engaging relevant stakeholders, experts and systems’ custodians; 7) mechanisms for linking sub national systems with national systems; 8) mechanisms for information assemblage into a transparent, consistent and comprehensive manner; 9) cost and resources to develop and maintain the system; and 10) strategies for regular updates.

Noting this gap within the UNFCCC provisions in providing the critically needed guidance on community monitoring of forest reference emissions level/forest reference levels and safeguards, this paper reviews and build up on works conducted by researchers on the subject and provides the most recent summary of information on how all the safeguards addressed and respected before they can receive results based payments”. Studies have demonstrated that, although community groups (individuals within communities) have multiple skills and expertise in a range of tasks and skills necessary for community forest and carbon monitoring (Danielsen et al., 2010; Muchemi, 2014; Larrazabal et al., 2012, McCall, 2011), there are critical limitations and deficiencies in these set of skills. Thus, the UNFCCC encouraged developing countries to develop guidance for effective engagement of indigenous peoples and local communities in monitoring and reporting on REDD+ activities as per decision 4/CP.15 paragraph 3 (UN, 2009). The development of relevant and adoptable guidance on community monitoring requires careful assessment of REDD+ roadmap (Figure 1), in order to identify the requisite monitoring tasks, the potential contributory role of communities to each tasks, the appropriate monitoring approaches and technologies that can be adopted by communities, and formulate modalities for engaging communities in the REDD+ monitoring process.

Community monitoring guidelines should provide modalities to ensure that all REDD+ project proponents fully and effectively engage communities in all REDD+ phases, with guidelines on how to engage both indigenous peoples and local communities. The set of guidelines should provide guidance to proponents on how to

ensure that communities receive the necessary financial, capacity building, technical and technological support to enable them to effectively participate in the monitoring and reporting. Further, the guidelines should provide standards and procedures for ensuring data and information collected are of optimal quality (GOFC-GOLD, 2010), adequate compensate for communities for their labour input and based on differentiated demonstration of good results (Larrazabal et al., 2012; Danielsen et al., 2010; Skutsch et al., 2009), provision of feedback to the community upon submitting data and information to the national forest agency (Muchemi, 2014), monitoring frequency is well scheduled over the REDD+ project phase (The REDDdesk, 2014), and that support required by community monitoring actions is scalable, adequate, and predictable (UN, 2010, 2009).

4. Guiding Principles for Designing a Community Monitoring Framework

The design of a community monitoring framework should consider three critical guiding principles. These include: 1) the planning and management levels at which the various data and information are demanded and supplied, some at national, and others at sub-national level; 2) the effectiveness of monitoring tasks, approaches and technologies to generate the various datasets and information; and 3) the efficacy of the forest governance structures that would facilitate the execution of monitoring tasks (Muchemi, 2014).

This paper suggest that NFMS should be hosted by the National Forest Agency who capacity to undertake estimation forest-related emissions using remote sensing and ground-based forest inventory should be built as well as provision of relevant technical, financial and technological support in a predictable and up-scaled manner.. The agency should ensures that the MRV system is robust enough to receive the large amount of diverse data and information generated from the various sub-national and community monitoring levels. In addition, the system should be inter-operable so as to ensure compatibility of the various data and information formats. Further, the system should have procedures for ensuring quality assurance and control to ensure data and information is correct, accurate, complete, up-to-date and secure (Muchemi, 2014). This is intended to ensure that data and information collected by communities at the various forest sites around the country is centrally received at the appropriate sub-national and/or national level for storage, retrieval, analyze, access and meaningful utilisation at all forest planning and management levels. We view the SIS as a compliance mechanism and therefore proposed that it be hosted by a separate independent institution with autonomy and no conflict of interests so as to act as a watchdog on how safeguards are respected and observed.

1) Elements of a Monitoring System

In general, a monitoring system consists of the following elements which include: 1) the rules, guidelines and protocols that define data collection, process, transmission and sharing routines; 2) data and information describing the aspect being monitored; 3) hardware or devices that aid data collection activities; 4) software for aiding data capture, transmission, process and sharing and 5) human resources who involve experts and local communities.

The execution of the monitoring process follows eleven inter-related steps. These include: 1) identification of monitoring goals and objectives; 2) determining monitoring spatial and temporal boundaries; 3) identification of monitoring questions that will help in determining process, proxy and impact accomplishments; 4) establishing the monitoring indicators that will provide data and information for answering the monitoring questions; 5) determining the most appropriate methods and tools that will assist in acquiring the capturing the monitoring indicators; 6) development of an appropriate sampling framework that is cost-effective, easy to use and free from biases; 7) validating of collected data and information by triangulating it using other applicable data collection methods; 8) analysis and interpretation; 9) assessment of level of attribution of impacts to both project and non-project activities; 10) sharing of results and soliciting for feedback; and 11) application of results into policy and management decisions (Catley, 1999; Watson, 2008; Chambers, 2007, Cromwell et al., 2001, Guijt, 1998).

2) Monitoring Goals and Objectives

The goals and objectives of community forest monitoring and safeguards tracking should be guided by the relevant provisions enactment for REDD+ policy as per UNFCCC decisions at CoP 15 and 16 and the relevant national policies (Table 1). The provisions stipulate two main goals which include 1) emissions reduction and 2) safeguards (UN, 2010, 2011, 2012) and as further elaborated and re-categorized to include by policies, human rights, socio-economic, biodiversity and environmental concerns (Muchemi 2014; Evans & Guariguata, 2008, Martin-Garcia and Diez 2012) (Table 1).

Table 1. UNFCCC and Kenya provisions for guiding the design of monitoring goals and objectives.

| REDD+ monitoring goals | REDD+ monitoring objectives | UNFCCC policy decisions | Equivalent Kenya's policy provisions and documentation |
|---|--|--|---|
| 1. Reduction and stabilisation of anthropogenic forest related greenhouse gas emissions from the biosphere | i. Estimation forest reference emissions levels | Decision 1/CP.16 paragraph 71 (b); | REDD+ RPP, 2010 |
| | ii. Identify drivers of deforestation and forest degradation | Decision 4/CP.15 paragraph 1 (a); | FCM Bill, 2014 NCCRS |
| | iii. Identify Land use, land-use change and forestry activities in particular those related to the drivers of deforestation and forest degradation | Decision 1/CP.16 appendix II (a); | FCM Bill, 2014 PART V; VI; VII; VIII; IX NCCRS |
| | iv. Identify eligible actions leading to emissions reduction and stabilisation of forest carbon stocks | Decision 4/CP.15 paragraph 1 (b) and decision 1/CP.16 appendix II (a); | FCM Bill, 2014 PART V; VI; VII; VIII; IX NCCRS |
| | v. Estimate anthropogenic forest-related emissions by sources and removals by sinks; forest carbon stocks and changes in forest carbon stock and forest area | Decision 4/CP.15 paragraph 1 (c) decision 1/CP.16 appendix II (d) | Constitution of Kenya, 2010 Article 69(1)(b) KFS strategic plan 2009/10 - 2013/14 NCCRS, Environment and forest policies |
| | i. Policy objectives: consistency with national forest programmes and international conventions and agreements, | Decision 1/CP.16 appendix I (2) (a) | Chapter 1 Article 2 (5) (6) NCCRS, Environment and forest policies and legislation |
| ii. Governance: effective and transparent Forest governance structures | Decision 1/CP.16 appendix I (2) (a) | FCM Bill, 2014 PART 11, V NCCRS Environment and forest policies and legislation | |
| iii. Human rights objectives: broad country participation especially indigenous peoples and local communities and potential use of their knowledge | Decision 1/CP.16 appendix I (2) (c) (d) | Constitution of Kenya, 2010, Article 69 (1) (c) NCCRS, Land Policy, Environmental policy, | |
| 2. Safeguarding Environmental and Social issues resulting from REDD+ implementation | iv. Socio-economic objectives: Land tenure, gender considerations and social benefits | Decision 1/CP.16 appendix I (2) (e) | Constitution of Kenya, 2010: Article 69 (1) (h) FCM, 2014, 55 (1) (2) National Land Policy NCCRS, Gender commission |
| | v. Biodiversity objectives: conservation of natural forest, | Decision 1/CP.16 appendix I (2) (e) | Constitution of Kenya, 2010 Article 69 (1) (e) FCM Bill, 2014 PART IV, 33 (2) (a); 35 (1) (a); 41 (1 - 4) Biodiversity policy NCCRS, Environment. Wildlife, Forest and Land policies |
| | vi. Environmental objectives: environmental benefits, risks reversals of REDD+ and emissions displacement | Decision 1/CP.16 appendix I (2) (e) (f) (g) | Constitution of Kenya, 2010 Article 69 (1) (a) (f) (g) FCM bill, 2014 35 (3) (a); 55 (3) EMCA (1999) Environment policy NCCRS, Forest and Wildlife |

Emissions reduction goal is aimed at instituting measures that reduce the greenhouse gas concentration in the biosphere. Thus, the data demanded should be those related to forest reference levels, drivers of deforestation and forest degradation and related land use and land cover (LULUCF), eligible actions leading to emission reduction and stabilisation of forest carbon stock and changes in forest carbon stocks and forest carbon stock and

forest area. The safeguards goal is aimed at ensuring REDD₊ actions produce socially and environmentally accepted benefits while preventing any potential negative impacts.

The overriding policy and legislative framework on both forest management and conservation in Kenya is the Constitution promulgated in 2010. The country has stipulated that the tree cover should be improved from its current 7% and be maintained to at least threshold of 10% of country's land area. This minimum threshold is currently being used as an instrumental guiding principle in formulating all forestry relevant policies, programmes and actions.

The constitution has also stipulated safeguard guidelines with respect to compliance with international policies frameworks, respect for human rights, addressing socio-economic issues, biodiversity conservation and addressing environmental issues.

Despite the classic outlook match between the Kenya policy and legislative framework of Kenya's and the UNFCCC REDD₊ policy provisions, the country is yet to establish rules and regulations that would give effect to these policy and legislative provisions, though some of the legislation such as Forest Act, 2005, EMCA, 1999, and Land Act, 2009 have rules and provisions to govern them but need relevant updating.

3) REDD₊ Monitoring Questions

The questions to guide the monitoring of forest carbon stocks and tracking of safeguards should be derived from REDD₊ goals and objectives. Thus, the first set of questions aimed at providing answers to forest carbon stocks should include forest emissions reference levels, drivers, LULUCF activities, eligible REDD₊ actions, forest carbon stocks, and changes in forest carbon stocks and forest areas (**Table 2**). The second set of questions aimed at providing answers to how safeguards are promoted and supported should include: policy compatibility, effectiveness and transparency of forest governance structures, human rights, biodiversity, socio-economic and environmental concerns (**Table 3**). Once the community formulated the monitoring questions they should be validated with other relevant stakeholders who would later use the data and information in participating in management of forests.

4) REDD₊ Monitoring Indicators

Establishment of REDD₊ performance indicators should take cognizance of the distinction between baseline and monitoring indicators. Baseline indicators should focus on and require a wide range of conditions that describe the target forest area prior to REDD₊ development, or in the early stages of REDD₊ implementation. In contrast, monitoring indicators should focus on a set of indicators that are feasible, useful and relevant to the REDD₊ strategy and that can be sustained with local capability, capacity, and resources.

The guiding criteria for selecting the most informative monitoring indicators for a REDD₊ actions included: 1) sufficiency to provide early indication of changes; 2) distribution over a wide geographic area within each forest management unit and entire ecosystem thus widely applicable or measurable in different parts of the forests management unit or ecosystem; 3) capability of providing a continuous and cumulative assessment over a wide range of REDD₊ implementation measures; 4) relatively independent of monitoring sample size (threatened areas or intervention sites); 5) easy and cost effective to measure, collect, assay and/or calculate; 6) ability to differentiate between natural cycles or trends and those induced by anthropogenic actions; and 7) relevant to REDD₊ actions such as sustainable management of forests (Muchemi, 2014; Guarin et al. 2009; Cook, 1976; Sheehan, 1984; Munn, 1988, Noss, 1990).

In addition, monitoring indicators should be *specific-target defined parameters*, measurable—*quantifiable*, achievable—*attainable with available resources and with planned time*, relevant—*precisely contribute to issue being monitored (forest carbon stocks and safeguards)* and time-bound—*specifics of start time (baseline) and end time (post-ante) of the monitoring routine* (Bogue, 2013, Doran, 1981; Yemm, 2013; Dwyer, et al., 2010).

REDD₊ monitoring indicators for measuring changes in forest carbon stocks consist of such quantitative parameters as area, weight, volume, counts, and geographic locations (**Table 2**).

Communities, when provided with the relevant capacities monitor most of the basic indicators such as tree metrics, drivers of deforestation and forest deforestation and degradation, and emissions reduction actions. They can also perform basic analysis such as local changes in forest area, changes in drivers' patterns and trends in emission reduction actions. These, however would need to be validated by professional in the respective areas.

Monitoring indicators for Safeguards: These should be monitored against three thematic issues that include policy consistency, respect for Social and human rights issues, and environmental conservation and protection (**Table 4**). In turn, the thematic issues are used to derive the corresponding monitoring questions, indicators as well as methods and techniques for data collection.

Table 2. Forest carbon stocks monitoring issues, questions, indicators and methods.

| REDD+ monitoring objectives | Monitoring questions | Monitoring indicators | Monitoring methods and techniques |
|--|---|---|---|
| 1. Forest reference emissions levels/forest reference levels | i. What is the estimated area of forestland? ii. What are baseline (initial or ante) above and below ground forest biomass, iii. What are baseline (initial or ante) above and below ground forest carbon stocks, iv. What are baseline (initial or ante) carbon dioxide equivalent) for the six carbon pools | <ul style="list-style-type: none"> • Forest area (ha) • Measure of DBH, H and canopy for both project and leakage areas • Baselines forest resources extraction levels (area, quantity, frequency) | <ul style="list-style-type: none"> • Remote sensing and GIS methods and use of such spatial tools as (GPS survey, smartphone survey) • Ground-based forest inventory of DBH, H and canopy cover with such tools as sunto-clinomter, callipers, diameter tape, laser ranger) |
| 2. Drivers of D & D | i. What are the various drivers leading to deforestation? ii. What are the various drivers leading to forest degradation? | <ul style="list-style-type: none"> • Baseline and post-ante list, area and geo-location of the various drivers (counts and geo-coordinates) | <ul style="list-style-type: none"> • Focused groups discussion • Field survey with such spatial tools as (GPS survey, smartphone survey) • Participatory-GIS using (participatory 3 dimensional model, Google, thematic , geotagged photos) |
| 3. Emissions reduction actions—these actions results from the strategy options chosen by the respective country | i. What are the LULUCF activities linked to drivers of deforestation and forest degradation? ii. What parts of the forest require REDD+ interventions? | <ul style="list-style-type: none"> • List, area and geo-location of the various LULUCF activities (counts and geo-coordinates) | <ul style="list-style-type: none"> • Focused groups discussion • Field survey with such spatial tools as (GPS survey, smartphone survey) • Participatory-GIS using (participatory 3 dimensional model, Google, thematic , geotagged photos) |
| 4. Forest area reduction levels/Forest emissions reduction levels—difference between baseline and post-ante sums of emission reductions and removals | i. What is the estimated post-ante forest area? ii. What is the difference between the baseline and post-ante forest area? iii. What are post-ante above and below ground forest biomass, iv. What are post-ante above and below ground forest carbon stocks, v. What are post-ante carbon dioxide equivalent) for the six carbon pools vi. What is the different between the baselines and post-ante emissions reduction levels (above and below ground biomass, carbon stock and carbon dioxide) | <ul style="list-style-type: none"> • List and geo-location of changes | <ul style="list-style-type: none"> • Remote sensing and GIS methods and use of such spatial tools as (GPS survey, smartphone survey) • Ground-based forest inventory of DBH, H and canopy cover with such tools as sunto-clinomter, callipers, diameter tape, laser ranger) |

Communities when provided with relevant capacity can monitor all the safeguards elements including policy, socio-economic elements, human rights, biodiversity and environmental issues. This however need to be validated by professional expert in the respective areas.

5. Community Monitoring Methods and Tools

The methods used in REDD+ monitoring are determined by the desired forest management indicators. Selecting the appropriate monitoring methods includes identifying the best technique that will provide the most accurate answer to each of the monitoring question in the most cost-effective way while engaging local actors and considering statistical constraints.

The UNFCCC through decision 4/CP.15 paragraph 1 (b) and (d) recommended the use of the most recent IPCC guidelines and a combination of remote sensing and ground-based forest carbon inventory approaches for

Table 3. Safeguards monitoring issues, questions, indicators and methods.

| Monitoring objectives | Monitoring questions | Monitoring indicators | Monitoring methods and techniques |
|---------------------------------------|---|---|---|
| 1. Policy | | | |
| a) Forestry objectives and programmes | <ul style="list-style-type: none"> To what extent are REDD-plus actions consistent with national forest programmes? | Compliances or of lack of it | Policy context analysis |
| b) International policies | <ul style="list-style-type: none"> To what extent are REDD-plus actions consistent with international policies—conventions and agreements? | Compliances or of lack of it | Policy context analysis |
| 2. Social and human rights issues | | | |
| a) Governance Structures | <ul style="list-style-type: none"> Have forest governance structures been established at sub-national and national levels? Are the governance structures effective in discharging their roles and responsibilities? <ul style="list-style-type: none"> Planning, Implementation Management Are transactions of the forest governance structures open for public scrutiny? <ul style="list-style-type: none"> Decision making process Financial Cost and benefits sharing | Non compliance | <ul style="list-style-type: none"> Focused group discussions Smartphone-aided survey |
| b) Social benefits | <ul style="list-style-type: none"> What are the social benefits (level of monetary and non-monetary benefits) | | <ul style="list-style-type: none"> Focused group discussions Smartphone-aided survey |
| 3. Humans rights | | | |
| a) Knowledge and rights | <ul style="list-style-type: none"> Does planning and management of forest included local and knowledge held by indigenous peoples and local communities? | Counts of occurrences of data, information and activities that utilises local and indigenous knowledge | <ul style="list-style-type: none"> Focused group discussions |
| b) Participation | <ul style="list-style-type: none"> Does the REDD+ planning and implementation process full and effectively involved relevant stakeholders Are indigenous peoples and local community involved in all the REDD+ stages Are contributions to REDD+ relevant decision making process made by IP's and LC's adopted in final documents and actions | <ul style="list-style-type: none"> Counts of relevant stakeholder participating in the process Counts of IP's and LC's engaged in each stage of REDD+ action Counts of contributions made by IP's and LC's and adopted by the government | <ul style="list-style-type: none"> Focused group discussions Smartphone-aided survey |
| 4. Biodiversity | <ul style="list-style-type: none"> Have REDD+ actions lead to protection and conservation of natural forests Have REDD+ actions lead to protection and conservation of ecosystem services Have REDD+ actions lead protection and conservation of biological diversity | <ul style="list-style-type: none"> Number of REDD+ actions prioritized for forest with high biodiversity Area of natural forest conserved Area of forest corridors/ connectivity established Trends in species | <ul style="list-style-type: none"> Focused group discussions Field inventory Smartphone-aided survey |
| 5. Environment | | | |
| Benefits | <ul style="list-style-type: none"> What are the related environmental benefits derived from REDD+ actions <ul style="list-style-type: none"> Climate change moderation Water regulation Food production Fibre production energy (fuel wood and charcoal) | <ul style="list-style-type: none"> Change is recordings of climate parameters Water discharge (m3s-1) Kilogrammes of food Length of fibre Kilogrammes of wood fuel and/or charcoal | <ul style="list-style-type: none"> Focused groups discussion GPS survey Smartphone-aided survey |

Continued

| | | | |
|-------|--|--|---|
| Risks | i. Has any natural forests or parts of it been converted to other forest types or land cover due to REDD+ actions? | <ul style="list-style-type: none"> • Hectares of natural forest suffered • Conversion | <ul style="list-style-type: none"> • Focused groups discussion |
| | ii. Has any natural forest or part of it which have been conserved through REDD+ actions been reversed to its earlier state before the actions | <ul style="list-style-type: none"> • Reversal • Area of neighbouring forest land affected by due to placing the target forest under REDD+ action | <ul style="list-style-type: none"> • GPS survey • Smartphone-aided survey |
| | iii. Has REDD+ actions led to displacement of activities in neighbouring forest areas | | <ul style="list-style-type: none"> • Ground truthing |

Table 4. FPIC proposed safeguards community monitoring within the framework of REDD+ policy mechanism in Kenya.

| Impacts | Safeguards measures |
|--|---|
| 1. Exclusion of certain vulnerable groups such as minority ethnic groups, women, youths and persons with disabilities) from the research process and benefits | <ul style="list-style-type: none"> • Conduct screening of all the vulnerable groups within the area and include them in the appropriate monitoring processes |
| 2. Failure by monitoring team to provide the communities with adequate time to consult and arrive at decisions | <ul style="list-style-type: none"> • Develop a flexible work plan that allow communities internal consultations |
| 3. Insensitivity by monitoring team for community’s work schedule | <ul style="list-style-type: none"> • Develop participatory work schedule based on seasonal calendars and 24 hour gender activity |
| 4. Intrusion into culturally sensitive areas | <ul style="list-style-type: none"> • Seek community modalities of inventorying sampling site that fall within sacred site or use alternative sampling sites |
| 5. Exposure of communities’ culturally sensitive information to outsiders through data collection, submission and transmission to the national forest information system | <ul style="list-style-type: none"> • Develop modalities for limiting the sharing of culturally sensitive information |
| 6. Lack or under payment of community inventory teams for monitoring services to the researcher | <ul style="list-style-type: none"> • Develop remuneration standards through negotiations and reference to similar work within the region |
| 7. Failure by monitoring team to provide feedback on the research findings | <ul style="list-style-type: none"> • Develop mechanisms for providing feedback on the research findings to all stakeholders in culturally acceptable way |
| 8. Elite and political capture of the monitoring process | <ul style="list-style-type: none"> • Develop modalities for maintaining broad community consultation and engagement throughout the monitoring process |

estimating, anthropogenic forest related greenhouse gas emissions by sources and removals by sinks (UN, 2009).

Noting that such monitoring approaches and technologies are likely to exclude forest communities—developing countries should devise mechanisms for devolving the monitoring approaches and technologies at community level. Technology devolution should be aimed at ensuring communities participate in the monitoring process, including identifying monitoring issues, indicators, and questions as well as accessing and using the equipment in data collection, analysis, and visualising. Often times technology experts only engage communities in a few of these steps due to various reasons including: the misconception that communities have limited capability to conceptualize the monitoring discourse, they have limited opportunity to access and are unskilled to manipulate equipment used by experts, and that they have limited skills to collect accurate data and analyse the data. For instance, despite UNFCCC resolutions requiring full and effective participation of communities in monitoring and reporting of REDD+ projects, nearly half of the official REDD+ projects in Asia, Indonesia, China, Lao and Vietnam, do not engage communities in data gathering (Knowles et al. 2010; Danielsen et. al. 2013; Skutsch 2011; Guarin and McCall 2012, McCall et al., 2012).

In an effort to comply with the UNFCCC requirement for full and effective engagement of indigenous peoples and local communities in all the REDD+ phases, proponents and implementers of REDD+ actions are actively searching for appropriate technologies for use by communities in collecting, transmissions, analyses and presentation of requisite REDD+ data and information. Several geo-spatial technologies have been proposed, designed, tested and used by communities with appreciable success. The GPS has been used in designing and locating sampling plots (Eak et al., 2008); Personal Digital Assistance (PDA) coupled with an external or inbuilt GPS facility and a GIS application aided with a geo-referenced base map or satellite image and data entry form

has been used in designing, locating sampling plots and entering and storing datasets (CIFOR, 2009; McCall, 2011, Larrazabal et al., 2012, Burgess, 2010; Danielsen, 2005; Danielsen, 2009; Danielsen, 2010; Berkes, 2000; Moller, 2004); and currently smartphones coupled with inbuilt GPS facility, digital Camera and video, applications that renders data entry forms, expanded storage capacity, SIM card (Muchemi, 2013, Pratihast et al., 2012; Larrazabal et al., 2012).

6. Application of Free, Prior and Informed Consent (FPIC) in Kenya

Free, Prior and Informed is human doctrine enshrined in international legislative framework that include UN Declaration on the Rights of Indigenous Peoples (UNDRIP) adopted by the UN General Assembly in 2007; ILO Convention 169 on indigenous and tribal peoples, adopted in 1989; and Report of the African commission's working group of experts on indigenous populations/communities adopted by African Commission on Human and Peoples Rights (ACHPR) at its 28th ordinary session in 2005. The instruments require that states to consult and cooperate in good faith with indigenous peoples before adopting or implementing policy, legislative and administrative measures (UNDRIP 2007, Article 19; ILO 169, Article 6), ensure their participation in formulation, implementation and evaluation of plans and programmes (ILO 169, Article 7), and projects (UNDRIP 2007, Article 32(2)) affecting their lands, their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of resources (UN, 2007; ILO, 1989). This paper argues that the domestication and eventual formulation and implementation of UNFCCC REDD+ policy mechanisms including participation of communities in monitoring of forest carbon stock changes and safeguards requires free, prior and informed consent.

Despite, Kenya's abstinence in adopting these key International legislative instruments, it has made several policy and legislative efforts to affirmatively enshrine and promoted critical human rights with respects to the equivalent marginalized communities. Kenya, in recognition and response to the existence of communities equivalent characteristics to the indigenous peoples and tribes -recognized as marginalized communities (CoK, 2010, Articles 260) and their structural marginalisation and discrimination, provided within its constitution, 2010, specific provisions that define and provide for affirmative measures for the participation of marginalized communities in policy, programmes, plans and projects (ACHPR and IWGIA, 2005) (Table 4).

Despite these efforts there are a lot of antipathy among indigenous peoples and local communities due to evident inconsistency in FPIC terminologies such as consent and consultation, government reluctance in adopting internally agreed terminologies such as indigenous peoples and instead using marginalized communities in its place, merging local communities and marginalized communities during consultation sessions, and lack of recognition and reparation of lands with ancestry claims from indigenous peoples.

Challenges to Community Monitoring

Despite the numerous potential benefits related to community monitoring, it's not without critical challenges which could be in the nature of capacity, technical, financial, and technological issues. Communities' monitoring loads additional responsibility on communities in addition to their ordinary and routine chores, thus requiring their time and resources which at times are already constrained. When not planned well and incentivized, it may lead to lack of participation objectivity, "volunteer burnout", inconsistent funding that leads to fragmentation of monitoring activities, compromise of data accuracy and validity of the data in guiding decisions making (Whitelaw et al., 2003, Savage, 2002). Notably, continuous monitoring progresses along period of technological changes with respects to proliferation of information communication technologies (ICT) such spatial techniques, image capture, and telephony, (Muchemi 2014). Thus, communities have challenges of keeping in tandem with such technological advancements. The collaborative nature of community monitoring between government and communities poses challenges of data ownership, trust on data custodial and utilisation and especially with culturally sensitive data and benefits accruing from data utilisation, shared feedbacks and continued update of the data (Fore et al., 2001; Engel and voshell, 2002; Nicholson., 2002).

7. Conclusion and Recommendations

The success of REDD+ in developing countries will be determined by the policy compatibility between the respective country's policy and legislative framework and the UNFCCC policy provisions, performance in reducing forest related emissions and the extent to which safeguards are promoted and supported. Based on a syste-

matic review of the three domains, we draw the following conclusions.

Although Kenya has a framework of policies and legislative that would enable the domestication of UNFCCC REDD+ policy mechanism at national level, it lacks the necessary rules and regulations for implementing REDD+ action at community level. Thus, Kenya should fast track the formulation of policies, legislations, rules, regulations, guidance and modalities pertaining to eligible REDD+ actions and safeguards.

Methodologies for data acquisition, entry, submission, analysis and reporting have increasingly progressed with advancement in information communication technologies. The numerous evidences of communities utilising GPS, PDA, and smartphone in Kenya attest to this assertion. However, there is need to harmonise the framework of REDD+ monitoring questions, indicators, methods and tools while leaving the finer details of the specific monitoring details to be determined by the respective communities in each specific site. This is because different forest sites exemplify area specific vegetation types, resources, drivers of deforestation and forest degradation, forest resources user groups, socio-cultural and livelihood practices, and capability handle data collection tools.

Kenya is still faced with the challenge of addressing historical land injustices with respect to gazetted forest land claimed to be comprised community land. However the constitution o Kenya, 2010 has provided affirmative mechanisms for addressing such claims though affected communities feel the process need to be expedited. In addition, human rights terminologies such as “Consultation versus Consent” with respect to FPIC and "Indigenous Peoples” versus “Marginalized Communities” with respect to adherence to international legislative framework is still a national discourse.

In addition, the issue of incentivizing indigenous peoples and local communities when undertaking communities monitoring of REDD+ actions and safeguards needs to be addressed so as to compensate their time and labour. Finally, legislative on benefits sharing needs to be fast-trucked incentivize indigenous peoples and local communities beyond the current business-as-usual access taking place in the absence of REDD+ actions.

Acknowledgements

I take this opportunity to acknowledge the authors and sponsors of this research for their effortless contribution in shaping this first paper in conceptualizing community monitoring for forest carbon stock and safeguards in Kenya. Specifically, in addition to the authors, I wish to thank the sponsors who included UNDP/GEF SGP Kenya office and Kenya Forest Service especially its programmes—Miti Mingi Maisha Bora—funded by Ministry of Foreign Affairs of Finland and the REDD+ Coordination Office and Focal Point. In addition, I thank University of Eldoret for providing the study platform for a PhD programme through which the corresponding author extracts this paper. Lastly, special thanks go to ERMIS Africa for providing an impetus for positioning this paper in proving local realities of community participation in forestry.

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