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**Original article**

# Assessing Nigeria's progress toward monitoring and measuring of forest carbon in the context of REDD+

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A R T I C L E   I N F O

A B S T R A C T

Reducing emissions from deforestation and forest degradation in developing countries is considered an efficient and lowest-cost measure to mitigate climate change. Organizations like The United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC), helps resolve essential challenges like availability/use of technology, administration, human capacity and low capacity to measure and quantify national forest carbon emission reductions from Reducing Emission from Deforestation and Forest Degradation (REDD+). This study assessed Nigeria's progress in implementing the requirements for monitoring and quantifying forest carbon stock in the context of REDD+. This study was through a case study research where national and international REDD+ documents on MRV were reviewed and analyzed. The results showed that Nigeria had an average ranking score for the establishment of administrative/institutional capacity; however, they ranked low both in its ability to acquire and make available essential technical tools/methods; and in the adoption of REDD+ ethical governance principles. This study shows that the nation had made considerable efforts in establishing administrative/institutional capacity even though unable to acquire relevant technological methods/capacities, competence, expertise, and incorporate REDD+ good governance practice in

MRV implementation. Findings of this study shows that high-order technical methods (e.g., remote-sensing and satellite land monitoring system-SLMS) are not freely available due to lack of financial capacity to acquire these tools. This study also reveals that there is low collaboration with communities and other key actors/stakeholders in the REDD+ MRV process. This study suggests that international organizations should lend support through the transfer and provision of technical tools/methods relevant for MRV, and this should be supplemented with training to develop vital capacity/skills for MRV. Also, Nigerian REDD+ administrative institution should encourage active inclusion and participation of all stakeholders, particularly, the local communities in its MRV implementation; their involvement will not only improve the monitoring and measurement of forest carbon stocks but will help in early identification of potential threats to the success and sustainability of the program.

## 1. Introduction

REDD+ is a forest-based climate change mitigation initiative that seeks to reduce anthropogenic greenhouse gas (GHG) emissions from deforestation and forest degradation in developing nations (UNFCCC, 2007); The United Nations Framework Convention on Climate Change (UNFCCC) is aimed at offering incentives to countries that implement and report performance from the mechanism at a national level (UNFCCC, 2007). During the thirteen sessions of Conference of the Parties (COP13), a three-phased approach with step-wise activities (Readiness, Pilot Demonstration, and Result-based payment) was adopted for REDD+ implementation (UNFCCC, 2010). The readiness phase involves the development of National Action Plan (AP), policies and Measures (PAMs), framework for accountability and capacity building; the pilot demonstration phase include implementation of strategies, policies, development of relevant technology and demonstration activities in pilot project to assess performance; and the result-based payment phase include payment for emission reductions measured, reported and verified (Maniatis et al., 2016).

Developing countries intending to participate in the mechanism must adopt the three-phased approached to conserve forests and reduce carbon emissions; measure and compare the enhanced forest carbon stock to a baseline (from historical records or projected into the future); report result; and the reported reduction are independently verified for accuracy (Gibbs et al., 2007; Williams, 2013; Asiyanbi et al., 2017). Reported performance, verified to be accurate, and aligns with UNFCCC data and methodological requirements, receives result-based payment/incentive (Gibbs et al., 2007). Unfortunately, many participating developing nations are unable to attain the stringent requirements set by UNFCCC and IPCC, particularly, the development of an effective NFMS that include MRV, which is a critical requirement that enabled access to the result-based incentive (Ochieng et al., 2016). This makes MRV a vital disputable issue in the negotiations for the sustainable implementation of REDD+.

In 2013, at COP19, UNFCCC parties negotiated and agreed on decisions to facilitate NFMS implementation, strategies/methodologies for establishing reference emission levels; and modalities to guide MRV for emissions reduction/removals from forests (UNFCCC, 2014b). Concerning MRV, the agreement confirmed earlier decisions at COP, particularly on REDD+ participating countries seeking to receive result-based payment need to measure, report, and verify its emission reductions by establishing an NFMS that includes MRV (UNFCCC, 2009;2010).

Nigeria is one of the countries in African, currently implementing the pilot project as part of its readiness and demonstration phases in line with the agreement reached during the thirteenth session of COP at Bali (UNFCCC, 2007). The nation's participation in REDD+ is aimed to curb the high rate of deforestation (estimated to be one of the highest in the world), mitigate climate change, and access the result-based incentive (Asiyanbi et al., 2017). The nation has scaled through the first and second phases of the mechanism evidenced through the submission of

its Readiness Preparation Proposal (R-PP); National action plan (AP), a demonstrated pilot project in Cross River State (CRS); and recently the submission of its sub-national and national forest reference emission level (FREL) (UN-REDD 2015; FGN 2018, 2019). It is yet to progress into the third phase, which is the result-based payment. The phases so far accomplished has been greeted with so much criticism of non-compliance with stipulated guidelines (Oyebo et al., 2010; Asiyanbi, 2016; Nuesiri, 2016; Asiyanbi et al., 2017; Nuesiri, 2017; Nuesiri, 2018b).

UNFCCC (2014a) reports recognize that most countries participating in REDD+ are unable to attain the data quality and measurement methodology for forest emissions reductions. Most developing countries, particularly those in Africa, like Nigeria, suffer from considerable technical setbacks and are unable to report enhanced forest carbon stock in the third phase of REDD+ (Gizachew and Duguma, 2016). With the conclusion of REDD+ at COP21 and its significant role in numerous Intended Nationally Determined Contributions (INDCs) submitted from tropical countries, it is essential to assess Nigeria's progress in implementing UNFCCC requirement on monitoring and measuring forest carbon in the context of REDD+.

Although many pieces of research has assessed developing countries capacity to implement monitoring and reporting of emissions reduction under REDD+ (Herold, 2009; Bucki et al., 2012; Romijn et al., 2012); Ochieng et al. (2016) submit that those studies limited their focus to the usefulness of MRV frameworks; and failed to assess country's ability to acquire relevant technical method; administrative capacity; or adopt good governance ethics in the process. To this note, this research evaluated the requirements of UNFCCC for the establishment of an NFMS under REDD+ and also assess Nigeria's progress to effectively monitor and measure forest carbon in the context of REDD+ in line with UNFCCC guideline under three categories: the availability of technical capacity and tools/methods, the establishment of administrative/institutional coordination, and adoption of REDD+ ethical governance principles

## 2. Materials and methods

This study adopted an exploratory qualitative research procedure commonly referred to as a "case study research method." A case study, according to Gerring (2004), involves a detailed study of a subject and aims to clarify its components. Fitzgerald (1999) also submits that subject matter that is new or under-researched is better understood through a case study research and can be explored using a given context. George and Bennett (2005) also opine that case study research method is most suitable to describe features in a subject that is understudied and to answer the "what," why," and "how" questions about its components. Although this research method has been criticized by some authors to produce a "loosely constructed story" (Fitzgerald, 1999; George and Bennett, 2005); Yin (2009) argue that this method can utilize data from different sources and forms; he also maintains that case study research method can generate relevant statistics from primary and/or secondary sources. Additionally, historical, in-situ, and observed data can be used in the case study research method to understand a subject matter and its characteristics or changes over time (George and Bennett, 2005; Yin, 2009).

### 2.1. Data source

The primary sources of data and resources for this study were published and unpublished pieces of literature; Nigerian REDD+ readiness documents; National REDD+ Strategy; documents and reported on Nigeria from the United Nations collaborative program on REDD+ (UN-REDD); UNFCCC reports and decision documents; journals and website relevant to REDD+ globally, and in Nigeria. Accessed data for this study were qualitative and provided an update and current status on forest carbon monitoring and measurement.

### 2.2. Data analysis

Information on REDD+ activities and MRV were used in this research, the data analysis was from on an extensive review of relevant pieces of literature, and analysis of documents (national and international). These documents included those listed above and other published MRV Framework.

This research adopted the framework developed by Ochieng et al. (2016) for assessing the ability of REDD+ participating nations to implement MRV in assessing Nigeria's progress. Ochieng et al. (2016) in developing this framework followed the methods proposed by Young and Levy (1999) in the assessment of environmental regimes, where he referred to "environmental regime" as globally set guidelines or procedure which stakeholders are expected to adhere with to achieve an expected outcome. The methods identified by Young and Levy (1999), which Ochieng et al. (2016) adopted includes:

✓ A problem-solving method investigates the extent to which an environmental mechanism can solve an identified problem that necessitated its proposal.

✓ The legal method investigates the extent to which an adopted mechanism or regime has met its core obligation.

✓ The economic methods integrate vital legal methods into the investigation but added an economic coefficient as an indicator of effectiveness.

✓ The normative method investigates the effectiveness of a mechanism by using standardizing principle inclusiveness and collaboration, and finally

✓ The political method which investigates changes in the action and concerns of the stakeholders, and the effectiveness of PAMs (Young and Levy, 1999).

The framework by Ochieng et al. (2016) integrated views and features of the second, fourth and fifth methods; but submits that the first, third and part of the fifth methods were less useful since UNFCCC guideline for REDD+ MRV is novel and evolving (Ochieng et al., 2016). Also, relevant performance indicators that were measurable and observable in line with the submission of Keohane (1993) were identified to aid the development of the framework.

A ranking score of a low, medium, high, and very high for each of the indicators was assigned. Each criterion and indicators were developed from IPCC methods for Land Use, Land Use Change and Forestry (LULUCF) and relevant pieces of literature (Ochieng et al., 2016). Details on the categories, criteria and indicators are shown in Table 1. The adapted framework, its variables, and indicators are presented in Table 2 and were used to analyze Nigeria's adherence to the UNFCCC guideline for REDD+ MRV under the three categories considered in this research. The nation's progress was determined by assigning a ranking score that best suits its level of progress based on reviewed documents and literature.

**Table 1**
Indicators and progress level for "availability of technical methods and capacity".

| Criteria | Indicator | Progress level | Score |
| --- | --- | --- | --- |
| Availability of technical methods and capacity to measures activity data 9AD), emission factor (EF) and MRV scope | Availability of remote sensing data | RS data (Including images, aerial photos) acquisition not planned | Low |
| | | RS data acquisition planned | Moderate |
| | | Acquisition of RS data started | Low |
| | | RS data regularly acquired | Low |
| | Availability of National Forest Inventories (NFI) | NFI not planned | Very High |
| | | NFI planned | Low |
| | | NFI (Including the establishment of PSP/TSP) started | Moderate |
| | | NFI regularly conducted | Low |
| | Developing a higher-order tier for estimating Emission Factor (EF) | EF development not planned | Low |
| | | EF development planned | Moderate |
| | | EF development (forest stratification, measurements) started | Moderate |
| | | Higher-order EF developed | Low |
| | The scope of REDD+ MRV (ability to covers all forests type, land uses and carbon pools) | Plans to measure only a few forests (and no other land use) | Low |
| | | Plans to measure only a few forests, land uses and carbon pools | Very High |
| | | Plans to measure only vital forests, land uses and carbon pools | High |
| | | Plans to measure all forests, land uses Low and carbon pools | Low |

Adapted from Ochieng et al. (2016).

**Table 2**
Framework for assessing Nigeria progress in implementing guideline and governance requirements for REDD+

| Approach | Variable | Indicators |
|---|---|---|
| Legal/Political | Acquisition and availability of technical capacity and tools to carry out MRV | Availability of tools to obtain activity data from forest area change. |
| | | Availability of tools to measure and quantify forest emission reductions. or estimating forest carbon stocks |
| | | The scope of REDD+ MRV (ability to covers all forests type, land uses and carbon pools) |
| Legal/Political | Establishment of administrative and institutional authority and capacity | Clearly defined procedures for MRV |
| | | REDD+ MRV linked to other GHG MRV systems |
| | | Training and building of relevant expertise and skills |
| | | Establishment of key collaborative partnerships |
| Normative | Adoption and Integration of sound governance principles in the MRV | Participation |
| | | Transparency |
| | | Accountability |
| | | Coordination |

Adapted from Ochieng et al. (2016)

## 3. Results

### 3.1. Availability of technical capacity and methods

Table 3 shows the progress Nigeria has made towards acquiring relevant technical capacities and methods to monitor and measure the performance of its activities under REDD+. The result of the analysis shows that Nigeria is yet to acquire remote sensing data and SLMS to monitor forest area cover and changes. Also, there is currently little to no plan in place to implement an NFI. Although the country seeks to monitor all forest types in its scope, the carbon pool is limited to only AGB. A moderate effort is made to estimate EF having designed a stratified cluster sampling plots as a substitute to a higher-order method of estimation.

**Table 3**
Nigeria's progress in acquisition and availability of methods and capacity for REDD+ MRV.

| Criteria | Indicators | Scores | Aggregate scores |
|---|---|---|---|
| Availability of technical methods and capacity to measures activity data (AD), emission factor (EF) and MRV scope | Availability of remote sensing data | Low | Low |
| | Availability of National Forest Inventories (NFI) | Low | Low |
| | Developing a higher-order tier for estimating Emission Factor (EF) | Moderate | Low |
| | The scope of REDD+ MRV (ability to covers all forests type, land uses and carbon pools) | Low | Low |

### 3.2. Establishments of administrative/institutional capacity

Table 4 shows that Nigeria is yet to develop MRV procedures that clearly state the methods, protocols, and approaches to the implementation. No plan links Nigeria's MRV implementation to another GHG system (as there is no exiting or reliable system). On the availability of expertise, Nigeria is in the process of developing more capacities through training of forestry department staff at the Federal and State level. The analysis also showed some effort to partner and collaboration with relevant national researching institutes (like Nigerian Airspace Research and Development Agency, NASRDA) to lend support on forest area monitoring; however, there is no partnership with regional African or international researching institute except the multi-national funding partners.

**Table 4**
Nigeria's progress in establishing administrative/institutional capacity for REDD+ MRV.

| Criteria | Indicators | Scores | Aggregate score |
|---|---|---|---|
| Establishment of administrative/Institutional capacity to carry out MRV | Availability of well-defined procedures for MRV | Low | Moderate |
| | REDD+ MRV data linked to other existing GHG systems | Low | Moderate |
| | Training and building of relevant expertise and skills | Moderate | Moderate |
| | Development of collaborative partnerships | Moderate | Moderate |

### 3.3. Adoption of REDD+ Good governance

Table 5 shows Nigeria's progress in integrating REDD+ good governance practice in its MRV implementation. On participation, Nigeria currently involves state and national forestry agencies but has developed a plan to involve other stakeholders. The analysis also showed that Nigeria has not planned how to resolve conflicts of interest of stakeholders or during benefit sharing in the MRV process. On transparency, there is currently no developed plan to make monitoring and measurement results available to the public in a timely and easily assessable manner. Little effort is made to enhance the transparency of REDD+ process, particularly in the development of GHG database and financial flow. On accountability, Nigeria has developed a planned framework for assigning roles and responsibility to the state and federal forestry departments. While the state department is responsible for making available all datasets, the federal forestry department provides governing and supervisory roles. However, the country is yet to establish a reporting channel and coordinate monitored and measured changes between the state and federal forestry agencies.

**Table 5**
Nigeria's progress in adopting REDD+ Good governance practice for MRV.

| Criteria | Indicators | Scores | Aggregate scores | Combined aggregate score |
|---|---|---|---|---|
| Participation | Inclusion of relevant stakeholders and sectors | Moderate | | |
| | Establishment of adequate participation mechanisms | Moderate | | |
| | Establishment mechanism for conflict resolution | Low | Moderate | Low |
| Transparency | Resultsof the monitoring aremade available to stakeholders at all level | Low | | |
| | Datasets, methodologies described publicly | Low | | |
| | MRV results provided on time | Low | Low | Low |
| Accountability | Clarifying roles | Low | | |
| | Clarified reporting channels | Low | Low | Low |
| Coordination | Establishment of effective inter-agency/multi-level coordination mechanism | Low | Low | Low |

### 3.4. Nigeria's overall progress in implementing UNFCCC requirements for monitoring and measurement of forest carbon in the context of REDD+

Table 6 shows Nigeria's aggregate level of progress in each of the categories considered.

Nigeria currently has a low overall score on the availability of technical methods and the capacity to monitor and measure changes in forest carbon stocks. In the establishment of administrative/institutional capacity with clear roles and responsibility, Nigeria ranks moderately. On the integration of REDD+ good governance practice and principles in MRV, Nigeria, again rank low.

Nigeria's low score on availability of technical capacity and methods can be attributed to the inability of the country to acquire remote sensing tools and SLMS, which are essential to generate activity data; and also, its inability to implement an NFI. Monitoring and measuring AD and EF with only country-specific methods do not guarantee the generation of data that meets the quality and standard for REDD+ reporting.

The average score for the establishment of administrative/institutional capacity is because there is a planned framework for MRV, but this framework failed to integrate all relevant stakeholders from the civil society, community, and private sector. Considerable inclusion is given to State and Federal department of forestry, while a weak level of collaboration exists with Forest Research Institute of Nigeria (FRIN) and Nigerian Airspace and Research Management Agency (NARSDA).

Finally, the low score on the adoption of good governance is because the administrative board has paid little attention to the importance of integrating expertise and knowledge of local communities in the monitoring and measurement process; and this has limited their access to the MRV process information and decision-making.

**Table 6**

Nigeria's aggregate scores and overall progress in meeting UNFCCC requirements for MRV.

| Criteria | Aggregate scores | Overall progress |
| --- | --- | --- |
| Availability of technical methods and capacity to measures activity data (AD), emission factor (EF) and MRV scope | Low | Low |
| Establishment of administrative/Institutional capacity to implement MRV | Moderate | Low |
| Adoption of REDD+ Good Governance (Participation, Transparency, Accountability, and Coordination) | Low | Low |

## 4. Discussion

The findings of this research reveal that Nigeria has limitations in its ability to monitor, measure, and report consistent and accurate GHG estimation from its REDD+ activities. These will be discussed under the three main categories that form the focus of this research.

### 4.1. Availability of technical capacity and methods

The analysis from this research indicated that Nigeria is yet to acquire vital technical methods and capacity needed for forest area monitoring and measurement, as shown in Table 3. The results confirm the position of some scholars like Bernard et al. (2014); Romijn et al. (2015); Gizachew and Duguma (2016); and Dube (2019) on the challenges that most developing nation particularly those in Africa are stuck at the implementation phase of REDD+ without the necessary capability to monitor, measure and report on their activities to achieve the goal of REDD+ - payment of financial incentive.

Although the most common and easy-to-use Lands at images is available free without a cost for developing nations to use for forest monitoring/measurement under REDD+, most of the countries, like Nigeria, lack human capacity to assemble the equipment and generate relevant data; and the financial capacity to make available an alternative (Ochieng et al., 2016; Dube, 2019). This challenge also applies to the Implementation of an NFI and hinders reliable estimation of AD and EF (Romijn et al., 2012).

While some developing countries have been able to overcome this challenge (Ochieng et al., 2016), those have been made possible with support from international multilateral and bilateral organizations such as the Food and Agricultural Organization (FAO) of the United Nations (Saket et al., 2010).

Given that high-order remote sensing and SLMS are not freely available (Wulder and Coops, 2014); and the capacity to carry out NFI is low (Romijn et al., 2015); there is a strong need for international organization to support developing nations, like Nigeria, to acquire the needed technical method and develop their capacity to use them.

### 4.2. Establishment of administrative/institutional capacity

Nigeria ranked moderate on its progress in establishing administrative/institutional capacity to carry out forest carbon monitoring and measurement, as shown in Table 4. The average score is attributed to a lack of clearly defined procedure on how emissions reduction would be monitored and measured in the context of REDD+; and also, to the non-existence of other reliable GHG systems to which REDD+ activities results could be compared or linked (FGN, 2018;2019).

In addition, the UNFCCC (2009) maintain that the development of REDD+ MRV is best suited under the context of Nationally Appropriate Mitigation Actions (NAMAs) and overseen by UNFCCC climate change focal group responsible for compiling and reporting National Communications (NC) on national GHG inventory; in Nigeria, responsibility for its implementation is with the Federal Ministry of Environment (FGN, 2013). The lack of clear links on how data from REDD+ MRV will be communicated to the UNFCCC focal group from the Ministry contributes to the average score in Nigeria's progress on establishing administrative/institutional capacity.

Despite that the finding of this research showed that Nigeria had started the recruitment and building of capacity of relevant expertise, only a limited number of persons have been recruited in the process, which is disproportionate to the geographical landmass of Nigeria. Since the inventory datasets are to be obtained on a national scale, training a negligible number of persons contribute to the slow progress for monitoring and measuring; this confirms the submission by Bernard et al. (2014) that most REDD+ participating countries, is yet to develop a systemic capacity building. Given that the task of monitoring and measuring the performance of REDD+ activities is enormous, the lack of clearly linked and defined administrative capacity in Nigeria, as depicted in the result of this analysis, is capable of hindering sustainable achievement of the intended goal.

### 4.3. Adoption of REDD+ good governance practice

As with the availability of technical capacity and methods for monitoring and measurement of emissions reduction, Nigeria ranked low in adoption and integration of sound governance principles for MRV implementation; this reveals another setback in progress made by Nigeria to comply with the UNFCCC requirements. According to Pratihast et al. (2013) and Asiyanbi et al. (2019), the active involvement of all relevant stakeholders is essential to track the impact of REDD+ activities. In Nigeria, although a mechanism for the participation of stakeholders was developed, the emphasis was more on the State and national forestry departments and agencies with little consideration given to the participation of other local actors (Asiyanbi et al., 2019). Having all the technical tools and regulatory networks for MRV activities may not help in attaining the goal of the mechanism if all relevant stakeholders are not given full right to participate both in the monitoring and decision-making process that affect them, particularly forest-dependent local communities (Asiyanbi et al., 2019).

The lack of involvement of these stakeholders could also result in a conflict of interest (Biermann and Gupta, 2011). Since reporting of monitored and quantified emissions reduction have to be on a national scale, this means that there will be a conflict of interest between participating stakeholders (Korhonen-Kurki et al., 2013; Ochieng et al., 2015; Rosa da Conceição et al., 2018). The analysis from this study indicated that Nigeria had paid little attention to the development of a mechanism that resolves conflict among stakeholders in the MRV process. Clearly stating the role of each stakeholder and collaborating to empower the stakeholders will not only help in resolving such conflict but also ensure sustainability and accountability (Austin et al., 2012).

Furthermore, transparent and timely reporting of the monitoring data to an appropriate regulatory authority can facilitate the development of other mitigation measures to curb the high rate of deforestation and forest degradation. Also, establishing effective coordination for the dissemination of measured results among stakeholders can improve social acceptance and sustainability of the mechanism.

### 4.4. Limitations

While this analysis had revealed Nigeria's progress towards monitoring and measuring forest carbon in the context of REDD+, it also had some limitations. One of the significant limitations of this study is its full reliance on secondary sources of data. Although there was an extensive review of the secondary data, it is also possible that Nigeria might have implemented or started planning for some of the items highlighted in the documents after they were published.

Also, there was a contradiction in the information provided in most documents, especially the Readiness Preparation Proposal; priority was given to the most recent information available in the FREL documents, which is the latest submission made by Nigeria to the UNFCCC.

Likewise, reviewing the various documents and analyzing them enabled me to develop "critical eyes" to identify only capacity gap in the MRV process; future study should incorporate analysis of documents with primary sources of data by scheduling interviews and meeting with focused groups to synthesis a more recent and up-to-date progress Nigeria has made in implementing monitoring and MRV functions of REDD+.

Finally, the sets of indicators and level of progress used in assessing Nigeria's progress, particularly those on good governance, did not cover all attributes of good governance; it would be essential to include other attributes and principles of good governance in any future study on Nigeria.

## 5. Conclusion

The assessment of Nigeria's progress to monitor and report forest carbon was in the context of REDD+; a global mechanism aimed at providing incentives to developing nations to voluntarily mitigate climate change through reducing emission from deforestation, forest degradation, conservation of forest carbon stocks, sustainable management of forest, and enhancement of forest carbon stocks.

The analysis revealed that Nigeria had made a low to moderate level of progress towards implementing technical requirements set out by the UNFCCC for monitoring and measuring performance from REDD+ activities.

While the nation has made significant efforts to establish required administrative/institutional capacity, it cannot technically manage and governed the mechanism.

Although the acquisition of technical tools is essential, developing human capacity at all levels is more critical for practical use and management of the tools; and easy attainment of national-scale data.

Failure to identify, collaborate, and integrate local knowledge from stakeholders at all levels, particularly at the grassroots, could also hinder the effectiveness and adequacy of the MRV process. Allowing the active participation of local stakeholders in the MRV process will not only ensure sustainability but will improve transparency, accountability, and better coordination of the process.

## Recommendation

Despite the shortcomings and limitations revealed from this analysis, Nigeria could leverage some practices to boost their chances to monitor, measure, and report performance from its REDD+ activities.

Since there is no reliable forest carbon inventory data in the country, and there is an excellent flexibility in the methods participating nation can adopt in line with their national circumstances (UNFCCC, 2011); Nigeria could follow a step-wise approach and draw from existing methods in neighboring African countries particularly those in Western, Eastern and Central African regions that have successfully measured and reported their REDD+ performance.

Also, given that negotiations and decisions of the UNFCCC for its Annex 1 and Non-Annex 1 countries follow the philosophy of 'common but differentiated responsibilities (UNFCCC, 2007), Nigeria could seek collaboration from Annex 1 countries and multinational organizations to monitor and report REDD+ performance. Such collaboration should be to transfer and provide appropriate technical tools; and make available free or at a reduced cost, satellite imagery with a high-order resolution.

Although the availability and provision of monitoring tools are essential, achieving a sustainable MRV is dependent on the national capacity to use the new technologies. Therefore, Nigeria could request that the provision of technical methods and tools be backed with training and development of vital skills from the collaborating partners.

While support from developed nations is essential, drawing from developing nations with the capacity to monitor and measure forest emissions reduction in the context of REED+ is critical. Nigeria could benefit and gain substantial insight from practices in other developing nations like Brazil, which have been reckoned to have a good experience in near and real-time measurement of its forest carbon stocks (May et al., 2010). Gaining insight from this kind of South-South collaboration has been reckoned to help build capacity to implement REDD+ and is evidenced in the case of the Congo Basin (Gizachew and Duguma, 2016).

Active inclusion and participation of stakeholders at the grassroots level, particularly the communities, can lend a significant improvement to emissions reduction monitoring/measurement; the involvement of the local actors will not only help in the monitoring but also in identifying potential threats to its success (Ochieng et al., 2016). This can be achieved by assigning responsibilities and equipping the local stakeholders with relevant tools like mobile hand-held devices to help them to carry out relevant monitoring and measurement (Pratihast et al., 2012); such community measurement provides additional local data and integrates indigenous knowledge and expertise (Ochieng et al., 2016). Aside from providing new data quality, active community participation helps to

reduce conflict in the monitoring process; it gives a sense of belonging to the local actors; and ultimately enhances accountability.

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