National REDD+ Strategy for Climate Change Mitigation: A Review and Comparison of Developing Countries

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Abstract: Reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable forest management and enhancement of forest carbon stocks (REDD+) in developing countries requires a National REDD+ Strategy (NRS) to ensure effectiveness, efficiency and equity. So far, only a few countries have submitted their NRS to the United Nations Framework Convention on Climate Change (UNFCCC) to progress to the implementation phase of REDD+. To compare the NRS of eight countries from Africa and the Asia-Pacific region, we used content analysis to assess whether these countries have paid attention to the REDD+ design components and adhered to the UNFCCC REDD+ rules. Our results demonstrate that all eight countries have paid considerable attention to REDD+ activities, finance, measurement, reporting and verification (MRV), and safeguard systems, and most countries have not adhered to the UNFCCC REDD+ rules on scale including the definition of national and subnational forests, subnational projects to be nested into national systems, and subnational activities to be verified by experts. REDD+ countries must develop definitions for national and subnational forests to enhance forest monitoring and they must develop technical and institutional infrastructure for MRV and safeguard systems, to receive results-based payments, and for the sustainability of REDD+ projects.

1. Introduction

Many developing countries have demonstrated a commitment to combating climate change through various programs and interventions such as the Payment of Environmental Services (PES), the Clean Development Mechanism, the Forest Investment Program (FIP), and the Forest Law Enforcement, Governance, and Trade (FLEGT) initiative, and other projects. However, in some countries, these programs and initiatives seem ineffective and inefficient in eliminating the drivers of deforestation and forest degradation, which have contributed significantly to global greenhouse emission. The drivers of deforestation are direct or indirect activities or actions at the forest frontier that impact forest cover. The direct drivers are agricultural expansion, illicit logging, fuelwood extraction, mining, and infrastructural development, while the indirect drivers are population growth, weak law enforcement, poverty, and corruption [1–3]. Deforestation has accounted for over 17% of global greenhouse gas (GHG) emissions [4,5], approximately 2 billion t CO_2 per annum to global green GHG emissions during the 1990s [6,7], and nearly 3 Gt CO_2 between 2000 and 2005 [8,9].

The rate of deforestation is still consequential in tropical developing countries despite numerous policies implemented to tackle its drivers. The forest area in sub-Saharan Africa declined from 30.6%

in 1990 to 27.1% in 2015, while in Latin America and the Caribbean, the forest area declined from about 51.3% to 48.2% in same periods, respectively [10]. However, Eastern and Southeast Asia saw a 1.1% increase in forest area from 1990 to 2015 [10]. In 2016, "global tree cover loss reached a record 29.7 million ha," 51% higher than in 2014 [11]. The decline in the forest area of these regions is a result of deforestation from agriculture, illicit logging, fuelwood extraction, and mining. The continuous deforestation and forest degradation in sub-Saharan Africa and Latin America have significant negative consequences on the livelihoods and food security of forest-dependent communities, indigenous people, and the rural poor. It is critical for developing countries, if REDD+ is to be successful, to develop strategies and implement actions that can effectively and efficiently tackle the drivers of deforestation and forest degradation and achieve sustainable development.

Implying that reducing emissions from deforestation and forest degradation and the role of conservation, sustainable forest management and enhancement of forest carbon stocks are equally important, after its introduction in 2007 at the conference of the parties (COP 13) of the United Nations Framework Convention on Climate Change (UNFCCC) in Bali, Indonesia, REDD+ has become a frontrunner for the global climate change mitigation strategy. REDD+ is said to be a cost-effective mechanism to curb deforestation and forest degradation and to mitigate climate change. Through the REDD+ program, developing countries are receiving financial, logistical, and technical support from the World Bank and United Nations via the Forest Carbon Partnership Facility (FCPF) and the UN-REDD Program, respectively, and from other institutions. For instance, Ghana has received over US$ 8 million from the FCPF for REDD+ readiness preparation. Currently, over 30 countries in Africa, the Asia-Pacific region, Latin America, and the Caribbean are receiving support from international actors [12,13].

The REDD+ program progresses in three phases based on the Cancun agreements at the COP 16 in 2010 in Mexico: (1) the readiness phase, (2) the implementation phase, and (3) the results-based payments phase [14–16]. The readiness phase involves the design and development of readiness preparation proposals (R-PP) and a national REDD+ strategy (NRS). The R-PP outlines studies, key processes, systems, stakeholder consultations, and capacity building activities required for a country to effectively implement the REDD+ mechanism, whiles the NRS defines the vision and goals for achieving REDD+, along with specified strategies and interventions for avoiding deforestation and forest degradation, forest conservation, sustainable forest management, and forest carbon stock enhancement. It further outlines mechanisms for reference-level establishment, monitoring, measurement, reporting and verification of carbon emissions reductions, infrastructure development, benefit-sharing, conflict resolution, and safeguard information systems depending on national circumstances (Figure 1). The implementation phase involves results-based demonstration activities, institutional reforms, and capacity enhancement, and finally, the results-based payments phase involves the Measurement, Reporting and Verification of REDD+ carbon impacts before payment [15].
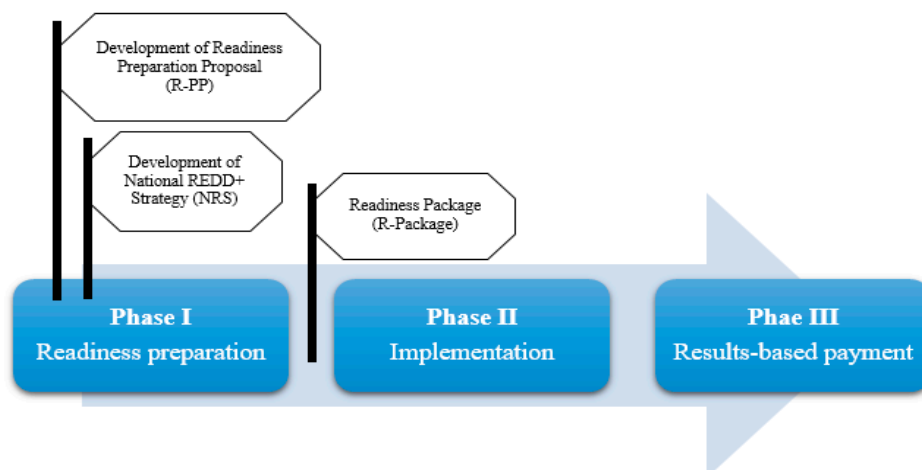
Figure 1. REDD+ program processes emphasizing the readiness preparation phase.

Countries have progressed in the design and development of R-PP. However, only a few have submitted NRS to the UNFCCC as one of the Warsaw Framework items for results-based payments and are now moving towards the implementation phase of the REDD+. An early implementation phase will require countries to submit a readiness package (R-Package), which is a self-assessment report outlining readiness organization and consultation, readiness strategy preparation, reference levels, and monitoring systems for forests and safeguards [15]. Countries such as Cameroon, Indonesia, Peru, and Vietnam have progressed with the planning, coordination, demonstration, and pilots, but they have challenges with MRV, financing, benefit-sharing and policies, laws, and institutional mechanisms [15]. Other studies have also indicated the challenges facing REDD+ processes in developing countries including the lack of extensive stakeholder participation [17], weak institutional capacity [18–20], and unclarified property or tenure rights [21]. REDD+ stakeholders must address these challenges and make REDD+ an effective, efficient, and equitable mechanism through institutional transformation and policy changes [22]. REDD+ is effective—when set goals such as carbon emissions reduction and biodiversity preservation are achieved; efficient—when there are minimal costs in carrying out REDD+ activities; and equitable—when there is fairness and inclusiveness in REDD+ process [23]. A well-designed REDD+ mechanism harmonized with other sectoral policies such as agriculture and energy along with good governance and effective institutional frameworks can result in effective implementation and sustainability of REDD+ in developing countries.

The COP of the UNFCCC made several decisions at the COP 13, 15, 16, 17, and 19, and established a range of policy measures to guide REDD+ countries in the development and implementation of REDD+ (Table 1). For example, at the COP 13 in Bali, parties to the UNFCCC decided to explore and identify options to control the drivers of deforestation and forest degradation at the national level and to develop initiatives for forest conservation, sustainable forest management, and the enhancement of forest carbon stocks [24]. At the COP 15 in Copenhagen, parties agreed on providing positive incentives to REDD+ countries to encourage REDD+ action, and thus, the Green Climate Fund was set up for REDD+ finance, and other climate change initiatives [25]. The parties again proposed a mechanism for the mobilization of financial resources from both the public and private sectors, international organizations, and Annex 1 countries. Annex 1 countries are industrialized countries part of the OECD (Organization for Economic Co-operation and Development) in 1992, plus countries with economies in transition. Furthermore, at the COP 16 in Mexico, parties made decisions for REDD+ countries to develop a national REDD+ strategy, national forest reference emissions levels or forest reference levels, and a robust and transparent national forest monitoring systems for REDD+ MRV [26,27].

Table 1. UNFCCC COPs rules on REDD+.

Design Component	Description	UNFCCC Decision
Activities	(1) Avoiding deforestation by for example keeping existing forest intact and addressing key drivers of deforestation. (2) Avoiding forest degradation by for example avoiding the conversion of natural forest to plantation forest. (3) Conservation of forest carbon stocks (4) Sustainable forest management by avoiding extraction of premature trees below 30 years of age. (5) Enhancement of forest carbon stocks through increasing indigenous high carbon value tree species and cover.	Decision 1/COP 16 Decision 2/COP 13
Scale	(1) National and subnational forests defined based on national circumstance e.g., 10% canopy cover for Kenya. (2) Subnational projects expected to be nested into national systems. (3) Subnational activities to be verified using expert standards.	Decision 2/COP 13 UNFCCC (2009)
MRV	(1) Credible, result-based nationally implemented measurement, reporting and verification (MRV) system. (2) The Monitoring process to apply scientific techniques of remote sensing, e.g., FAO approaches within the Intergovernmental Panel on Climate Change's Land Use, Land-Use Change and Forestry guide. (3) International verification through internationally accepted standards such as the verified carbon standards (VCS) or team of experts. (4) Avoiding leakage—avoiding shifting drivers of deforestation to other areas. National MRV to help avoid leakage. (5) Additionality—requires that REDD activities increase carbon storage above the level at which of would occur without the activity. (6) Permanence—measures to ensure that emissions avoided are not reversed through future deforestation.	Decision 4/COP 15 Decision 1/COP 16 Decision 12/COP 17 Decision 10/COP 19 Decision 11/COP 19 Decision 13/COP 19 Decision 14/COP 19 Decision 15/COP 19 UNFCCC (2009)
Finance	(1) Result-based funding (2) Both market and public sources: can be in form of grants, loans, budgetary support, among others. (3) Funds should be managed Principles for REDD+ finances including transparency, accountability, predictability	Decision 4/COP 15 Decision 2/COP 17 Decision 9/COP 19 UNFCCC (2009). UNFCCC (2012)
Safeguards	(1) Community consultation on land and carbon rights. (2) Community consent in line with the UNFCCC safeguards. (3) Sustainable development and poverty alleviation (4) Equitable benefit-sharing and conflict resolution mechanism (5) Biodiversity conservation	Decision 4/COP 15 Decision 1/COP 16 Decision 12/COP 17 Decision 12/COP 19 FCPF (2012)

Source: Adapted from [28].

Some countries have developed the NRS, taking cognizance of the decisions of the UNFCCC COPs, which are to ensure that REDD+ works effectively, efficiently, and equitably. Some studies based on a literature review and document analysis of R-PPs, NRS, MRV Framework Documents, and Conference Reports, among others, have determined the progress of developing countries in instituting REDD+ mechanisms [15], implementing the technical guidelines and good governance requirements [16], managing the interaction with national policies and programs with the UNFCCC COPs rules on REDD+ [28], and have analyzed the equity of Ghana's national REDD+ process [29] and how countries plan to implement REDD+ in line with the Paris Agreement [30]. However, these studies have not deeply analyzed how countries pay attention and adhere to the UNFCCC COPs rules on REDD+ in the development of an NRS and how it can affect REDD+ implementation and the results-based payment. We attempt to address this gap in the literature.

Previous studies revealed that REDD+ countries readiness priority needs are stakeholder participation, non-carbon monitoring, and cross-sectoral coordination, whereas the design of benefit-sharing, conflict resolution, and revenue management systems are challenges faced by a few countries [12]. Also, REDD+ countries have mixed performance for various REDD+ functions [15]. Again, most REDD+ countries have low to moderate administrative capacity and governance structures to effectively implement REDD+ MRV consistent with the UNFCCC COPs decisions on REDD+ MRV [16]. Furthermore, Ghana has multiple of barriers to realizing equitable REDD+, although the country's NRS and other forest-related documents are to ensure equitable REDD+ [29]. Additionally, countries planning to implement REDD+ face political traction, but hopeful that public and private

donors will fund domestic conservation programs [30]. Although these studies have explored some aspects of the REDD+ mechanism, there is still a lacuna in the subject area.

In this paper, we review and compare the national REDD+ strategy documents of developing countries from Africa and the Asia-Pacific region, relative to their attention and adherence to the decisions of the UNFCCC COPs on REDD+. We specifically seek to (1) identify the REDD+ design components that dominate the NRS document, (2) determine the countries level of attention to the UNFCCC COPs REDD+ rules, and (3) analyze how the attention level of a country can affect REDD+ implementation. This paper provides insights on the specific strategies crucial to addressing the drivers of deforestation and forest degradation and exposes the significant gaps in the NRS documents for achieving an effective, efficient, and equitable REDD+. The paper can provide lessons for countries yet to develop an NRS so that they can pay critical attention to the decisions of the UNFCCC COPs on REDD+ for consistency and so that countries that have already developed an NRS can reformulate new policy measures to address any gaps to achieve sustainable development.

2. Method

For our analysis, this study primarily focused on NRS documents submitted to the UNFCCC. The NRS documents were retrieved in August 2018 from the websites of the FCPF and UN-REDD Program. The analysis excluded NRS documents that were not available in English, submitted as initial and not full versions, or those incorporated into a Readiness Package. In all, we included eight NRS documents of REDD+ countries from Africa and the Asia-Pacific region in the analysis (Table 2).

Table 2. REDD+ countries NRS documents reviewed in this study.

Source	Region	
	Africa	**Asia-Pacific**
FCFP www.forestcarbonpartnership.org	Ethiopia Ghana Liberia Zambia	Papua New Guinea (PNG) Nepal
UN-REDD www.unredd.net		Indonesia Sri Lanka

We used iterative content analysis approach (see [28] for details) to systematically analyze each country's NRS document based on the UNFCCC REDD+ rules or framework shown in Table 1. The content analysis is a flexible and useful method for analyzing documents obtained from different sources such as newspapers, journal articles and organizational reports among others either qualitatively or quantitatively. In this case, we used the mixed methods approach, which includes categorization of text into sub-components and analyzing them. We used vertical interaction approach to retrieve and code text and statements in the NRS documents that link to the UNFCCC REDD+ rules. These rules serve as technical guidelines or a framework for REDD+ countries to develop strategies depending on the national circumstances for addressing the drivers of deforestation and forest degradation. We assume that these rules, if adhered to and implemented, will contribute to an effective, efficient, and equitable REDD+ in developing countries.

With the aid of ATLAS.ti version 8 software (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany, 2017), we coded strategies that were developed or actions in line with the UNFCCC REDD+ rules as 1 (Yes) and those with no consideration of the UNFCCC REDD+ rules as 0 (No). ATLAS.ti 8 is a sophisticated workbench for qualitative data analysis, which allows you to flexibly and systemically extract, compare, explore, and reassemble data creatively. This quantification helped the researchers to identify which REDD+ design components were prioritized or given much attention and which countries had an NRS more consistent with the UNFCCC COPs decisions. We added the values of the indicators representing each REDD+ design component and ranked them from very low

(1) to very high (5) for the REDD+ Activity, MRV, and Safeguards, while the values for REDD+ scale and finance were ranked from low (1) to high (3). The results of the five REDD+ design components and the countries with an NRS more consistent with the UNFCCC COPs decisions were graphically represented using a spider-web diagram and bar chart, respectively.

3. Overview of the National REDD+ Strategy from our Studied Countries

The NRS is evidence of REDD+ countries commitment to achieving REDD+. Most REDD+ countries pay much attention to climate change mitigation due to their vulnerability to the impact of climate change and the need for sustainable development. The REDD+ countries are mainly agricultural-based economies, and thus, they are very sensitive to climate change, which is a social, economic, and environmental threat to these countries. The REDD+ countries included in this study are tropical developing countries with serious drivers of deforestation and other characteristics that hinder REDD+ implementation [31,32]. Additionally, these countries have progressed from the development of R-PPs to NRS and appear ready to implement REDD+.

The REDD+ countries experience high rates of deforestation and forest degradation. In Ethiopia, the annual forest lost was about 95,000 ha between 2000 and 2013 [33]; Papua New Guinea lost about 261,528 ha of forests, and 2.4 million ha forests were degraded due to logging in the same period between 2000 and 2015 [34]. Similarly, Ghana loses approximately 135,000 ha forests annually due to powerful direct and underlying drivers, affecting the ecosystem and environmental integrity of the country [35].

The REDD+ countries mainly seek to reduce emissions from deforestation and forest degradation, increase forest cover, and achieve sustainable development. To this end, the REDD+ countries have implemented various policy actions, measures, and other mechanisms in the NRS document for effective, efficient, and equitable REDD+ implementation (Table 3). The NRS document is divided into five parts: policy actions and measures or strategy (PAMs), Forest Reference Level (FRL), National Forest Monitoring System (NFMS), Safeguard Information System (SIS), and Finance for REDD+ Strategy. The PAMs highlight strategic interventions to control the drivers of deforestation and forestation, conserve and enhance forests carbon stocks, and manage forests sustainably. The NFMS indicates the actions required to provide data and information that are transparent, consistent over time, suitable for measuring, reporting, and verifying anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest area changes. The FRL provides the historical average of net emissions from forests, which provides the basis to assess the performance of REDD+ policy intervention. The SIS indicates policies and measures that aim to address both the direct and indirect impact of REDD+ actions on indigenous people, forest-dependent communities, and ecosystems, such as the enhancement of positives and minimizing the negatives of REDD+. REDD+ Finance deals with the source and management of funds in line with the UNFCCC guidelines.

Table 3. Overview of REDD+ policy mechanisms in the NRS documents of our selected countries.

Country	National REDD+ Strategic Framework				
	PAMs	**FRL**	**NFMS**	**SIS**	**Finance**
Ethiopia	- Improve institutional and human capacities to enforce laws on forest activities - Increase afforestation, reforestation, and sustainable forest management - Reduce demand for fuelwood by advocating for fuel-efficient stoves - Agricultural intensification	- FRL first submitted to the United Nations Framework Convention on Climate Change (UNFCCC); the Forest Reference Emission Level for deforestation is 17.9 Mt CO_2/year/year; FRL for afforestation is 48 Mt CO_2/year	- The NFMS consists of two functions: MRV and Monitoring functions. The MVR is for reporting GHG inventories	- Sharing of benefits based on the principle of equity	- Explore options for the establishment of domestic financing mechanism such as from public sources, public-private partnership, etc. - Active involvement in international climate negotiations to access international, bilateral and market-based finance
Ghana	- Improve land use and socio-economic development in the High Forest Zone (HFZ) and cocoa growing areas - Address wood harvesting and agricultural practices in the savannah woodland zones - Policy and legislative reforms	- FRL for closed forest and open forest is155 tC/ha (568 t CO_2e) and 87 tC/ha (319 t CO_2e), respectively - FRL for non-forest land use (cropland) is 15 tC/ha (54 t CO_2e)	- Combination of ground-based sampling and remote sensing-based approaches for estimating changes in forest carbon stocks	- This is not yet developed. However, the design will ensure fair and effective participation of government and non-governmental institutions, using acceptable processes and procedures	- Maximize existing sources of investment by the private sector and leverage synergistic initiatives of Non-Governmental Organizations (NGOs) and development partners, while seeking new investment to support REDD+ implementation activities
Indonesia	- Sustainable landscape management - Implementation of an economy based on sustainable natural resource management - Conservation of natural forests and rehabilitation of denuded forest areas - Strengthening forest and land-use governance - National Action Campaign: "Save Indonesia's Forests"	- Not stated	- Implementation of IPCC Tier 2 MVR to meet subnational needs in pilot and priority provinces - A country-wide system will be in place to achieve Tier 3 MVR realization of verified emission reduction at all project sites	- Fair distribution of benefits based on parties' rights over the area of the REDD+ project location	- Funding from a variety of potential sources, and the funding instrument will work with a wide variety of users, and be managed with a multi-stakeholder approach

Table 3. *Cont.*

Country	National REDD+ Strategic Framework				
	PAMs	**FRL**	**NFMS**	**SIS**	**Finance**
Liberia	- Reduce forest loss from chainsaw logging, charcoal production and shifting agriculture - Reduce impact of commercial logging in all forestry concessions - Complete and manage a network of Protected Areas - Prevent clearance of high carbon stock and high conservation value forest in agricultural and mining concessions - Fair and sustainable benefits from REDD+	- Not stated	- Existence of a roadmap for the establishment of MVR system	- Already existing mechanisms for equitable benefit-sharing e.g., "National Benefit-Sharing Trust"	- Financing REDD+ readiness and achieving emissions reduction will be from both market and fund-based
Nepal	- Reduce carbon emissions, enhance forest carbon stocks, and improve supply of forest products - Increase non-carbon benefits of forests ecosystems - Promote private and public land forestry, and optimum land use across all the physiographic regions - Increase agricultural productivity of forest-dependent and other smallholders	- Estimation of national FRL is underway using data FRA (2010-2014) data and other available inventory data between 1986 and 2010.	- The NFMS is yet to be designed in line with decisions of the UNFCCC COPs to provide data and information that are transparent and consistent, and appropriate for MVR	- The SIS is yet to be established considering the decision on guidance during UNFCCC-COP 21	- External financing for REDD+ activities is required. The country will transform the REDD IC into a semi-autonomous National REDD+ Center (NRC) that can seek funds and can enter into partnership with international/bilateral climate finance
PNG	- Strengthen and coordinate national level development and land-use planning - Strengthen climate change legislation, financing, and management - Strengthen forest management and enforcement practices	- Not stated	- Already established NFMS that builds on existing systems e.g., TerraPNG and Forest Resources Inventory Mapping System (FRIMS) for land use and forest resource mapping, respectively.	- Developed a roadmap for achieving an effective REDD+ safeguards system	A combination of government, private sector and civil society finance options will be accessed both domestically and internationally

Table 3. *Cont.*

Country	National REDD+ Strategic Framework				
	PAMs	**FRL**	**NFMS**	**SIS**	**Finance**
Sri Lanka	- Improve forest law enforcement and monitoring - Strengthen sustainable management of natural forests and plantations - Support inclusion of Strategic Environmental Assessment under Land-Use Planning - Improve land productivity and rehabilitation practices - Strengthen local supply chain for fuelwood demand	- FRL submitted (initial version): removal -70,000 t CO_2eq and emission 4,596,000 t CO_2eq	- Combination of data sources and assessments to estimate anthropogenic GHG emissions	- Focus efforts in reducing high-level risks and enhancing high-level benefits. Benefits and risks of PAMs will be iteratively re-assessed through "learning by doing"	- Financing for REDD+ actions will be addressed by external funding first as investments and later as result-based payments
Zambia	- Improve institutional effectiveness and governance structures to protect national and local forests - Enhance participatory approaches to local and traditional authorities' role in forest management - Develop generic cost–benefit-sharing principles for management of forests in open areas - Provide performance-based incentives for climate smart agricultural practices - Promote energy-efficient wood fuel-use technologies	- FRL is not yet developed since the Integrated Land-Use Assessment II is still in the process of completion and the country is yet to generate activity data on deforestation and forest degradation as well as complete the land cover mapping	- Established NFMS to provide near real-time spatial data on deforestation and forest degradation	- Adoption of UN-REDD Program Country Approach to Safeguard Tool (CAST), which provides the Zambian stakeholders with an interactive instrument to plan a national Safeguard system	- Financing for REDD+ activities includes domestic, private, bilateral, and multilateral donors

4. Results

Figure 2 summarizes the countries considerations of the REDD+ design components. Table 4 highlights the key findings of the indicators representing the REDD+ design components from each country and Figure 3 summarizes the country's level of attention to the UNFCCC COPs REDD+ rules.

Figure 2 demonstrates that there have been a variety of considerations of the REDD+ design components. All the countries have paid considerable attention to REDD+ actions, which involves avoiding deforestation, avoiding forest degradation, the conservation of forest carbon stocks, sustainable forest management, and the enhancement of forest carbon stocks [14], followed by finance, MRV, and safeguards. However, most countries have paid low attention to the REDD+ Scale, which involves forest definitions both at the national and subnational levels, subnational projects expected to be nested into national systems, and subnational activities to be verified using expert standards.
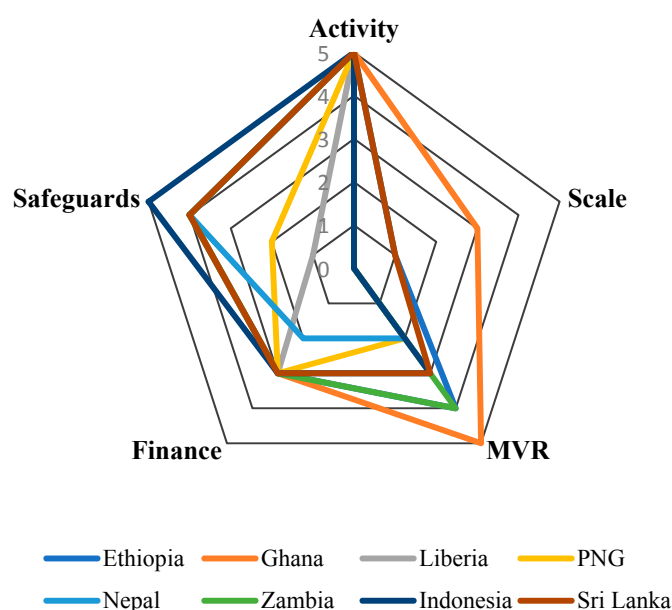

Figure 2. A spider-web diagram of REDD+ design components considered in the NRS from our study countries.

All the countries from our study, in compliance with the decisions of the UNFCCC COPs, have developed various strategic PAMs depending on the national circumstances to address the drivers of deforestation and forest degradation, while at the same time conserve and enhance forest carbon stocks and sustainably manage forests (Table 4). In our study, countries, the notable drivers of deforestation and forest degradation include agricultural expansion, fuelwood extraction, mining, and urbanization. Ghana, for instance, has outlined interventions and activities in their NRS document, based on stakeholder consultations, to address the drivers of deforestation and forest degradation and to promote the impact of REDD+ such as agricultural intensification, forest certification, mining regulation and plantation development among others [35]. Although these strategic interventions have been developed, countries will have challenges with implementation due to the lack of political will, policy coordination, weak legal and regulatory frameworks, and weak law enforcement. For example, in Ghana, "the Community Resource Management Area (CREMA) mechanism still lacks legislative backing, despite being before Parliament for a length of time" [35] (p 47). Additionally, in Indonesia, challenges to the legal basis of state forest management, forestry, and decentralization laws are still unresolved [15,36]. It is critical for countries to address the potential challenges that will hinder the progress and success of the REDD+. Brazil has achieved success for reducing deforestation due to strong political will and improved policy enforcement [37].

Table 4. Highlights of the considerations of the decisions of the UNFCCC COPs.

(a)

Country	Indicators of UNFCCC Decisions on REDD+ Activity					Score
	Strategies for Avoiding Deforestation Developed?	**Strategies for Avoiding Forest Degradation Developed?**	**Strategies for Conservation of Forest Carbon Stocks Developed?**	**Strategies for Sustainable Forest Management Developed?**	**Strategies for Enhancement of Forest Carbon Stocks Developed?**	
Ethiopia	●	●	●	●	●	Very high
Ghana	●	●	●	●	●	Very high
Indonesia	●	●	●	●	●	Very high
Liberia	●	●	●	●	●	Very high
Nepal	●	●	●	●	●	Very high
PNG	●	●	●	●	●	Very high
Sri Lanka	●	●	●	●	●	Very high
Zambia	●	●	●	●	●	Very high

Country	Indicators of UNFCCC Decisions on REDD+ MVR					Score
	Credible, Result-Based MVR Considered?	**Monitoring Process Applying Remote Sensing Techniques Considered?**	**International Verification through Internationally Accepted Standards Considered?**	**Strategies for Avoiding Leakage Considered?**	**Strategies to Ensure Permanence Considered?**	
Ethiopia	●	●	●	●	x	High
Ghana	●	●	●	●	●	Very high
Indonesia	●	●	●	x	x	Moderate
Liberia	●	●	●	x	x	Moderate
Nepal	●	●	x	x	x	Low
PNG	●	●	x	x	x	Low
Sri Lanka	●	●	●	x	x	Moderate
Zambia	●	●	●	●	x	High

Country	Indicators of UNFCCC Decisions on REDD+ Safeguards					Score
	Community Consultation on Land and Carbon Rights Specified?	**Community Consent in Line with UNFCCC Safeguards Specified?**	**Strategies for SD and PA Considered?**	**Strategies for Equitable BS and CRM Considered?**	**Strategies for Biodiversity Conservation Considered?**	
Ethiopia	●	●	●	●	x	High
Ghana	●	●	x	●	●	High
Indonesia	●	●	●	●	●	Very high
Liberia	x	x	x	●	x	Very low
Nepal	●	●	●	●	x	High
PNG	●	●	x	x	x	Low
Sri Lanka	●	●	●	●	x	High
Zambia	●	●	●	●	x	High

Key: SD—Sustainable Development, PA—Poverty Alleviation, BS—Benefit-Sharing, CRM—Conflict Resolution Mechanism; Score: Very high = 5, High = 4, Moderate = 3, Low = 2, Very low = 1, and 0 = no evidence; ● = Yes and x = No.

(b)

Country	Indicators of UNFCCC Decisions on REDD+ Scale			Score
	National and Subnational Forests Defined	**Subnational Projects Expected to be Nested Specified?**	**Subnational Activities to be Verified Using Expert Standards Specified?**	
Ethiopia	●	x	x	Low
Ghana	●	●	●	High
Indonesia	x	x	x	No evidence
Liberia	x	x	x	No evidence
Nepal	x	x	x	No evidence
PNG	x	x	x	No evidence
Sri Lanka	●	x	x	Low
Zambia	x	x	x	No evidence

Country	Indicators of UNFCCC Decisions on REDD+ Finance			Score
	Result-Based Funding Indicated?	**Sources of Funding Specified?**	**Funds to be Managed in Line with REDD+ Finance Principles Specified?**	
Ethiopia	●	●	●	High
Ghana	●	●	●	High
Indonesia	●	●	●	High
Liberia	●	●	●	High
Nepal	x	●	●	Moderate
PNG	●	●	●	High
Sri Lanka	●	●	●	High
Zambia	●	●	●	High

Score: High = 3, Moderate = 2, and Low = 1; ●= Yes and x = No.

In terms of the MRV of REDD+, we observed that all the countries have considered developing a credible, results-based MRV system and applying remote sensing techniques for the monitoring and reporting process. Apart from Nepal and PNG, the other six countries have indicated that both domestic and international technical experts will be used for the verification of GHG emissions reduction. Ethiopia, for example, explicitly states that the verification of emission reductions will be carried out in a two-step process: (1) by national experts endorsed by the government, and (2) by international experts from the UNFCCC or a partner engaged in the REDD+ results-based payments with the government of Ethiopia. However, nearly all the countries have not indicated their measures to avoid leakage and ensure permanence when the REDD+ is eventually implemented. In Ghana, however, a CREMA (CREMA—Community Resource Management Area mechanism developed in Ghana to facilitate community-based wildlife management and habitat protection, with the aim of creating opportunities for income generation and poverty reduction [35] mechanism has been developed, which from the REDD+ standpoint can avoid leakage and ensure permanence and equitable benefit-sharing. According to Meridian institute, countries adhering to the methods or guidelines of the IPCC ensures compliance with the MVR of REDD+ [38]. Some of the countries have indicated their compliance to the IPCC LULUCF and the UNFCCC guidelines see [34,35,39]. The Ghana NRS document stated as follows:

> *"In developing and establishing its REDD+ MMVR system and methodologies, Ghana will follow and comply with the IPCC Guidelines for National GHG Inventories (2006), IPCC Good Practice Guidance for LULUCF, as well as the FCFP Carbon Fund Methodological Framework"* [35] (p 54).

In terms of safeguards, apart from Liberia, all the countries have specified commitments to hold extensive stakeholder or community consultations and a willingness to apply the principles of free, prior, and informed consent in the REDD+ process. Apart from PNG, all the countries have considered establishing mechanisms for equitable benefit-sharing and conflict resolution. Ghana, for example, has already developed a CREMA and adapted the joint UN-REDD/FCFP feedback and grievance redress mechanism to ensure that benefits accrued from REDD+ are shared equitably and to resolve any conflict situation at the district, community, and national levels in the course of the REDD+ process. However, apart from Ghana and Indonesia, the countries have not considered strategies for

biodiversity conservation. Ghana has specified the protection of natural parks and reserve forests to conserve biodiversity, adopt enrichment planting, develop law enforcement to ensure compliance, and they have developed a CREMA, while Indonesia has established a protected area function that controls the conversion of forests and peatlands, and the restoration of forests.

In terms of finance for REDD+, nearly all countries have indicated REDD+ as a results-based funding mechanism, and the sources and management of funds are in line with REDD+ financing principles. All the countries specified that funding of the REDD+ activities would be from both public and private sources as well as international institutions. Countries such as Ghana, Liberia, Indonesia, and Zambia have indicated the establishment of a National REDD+ Fund to ensure the transparency, accountability, and predictability of the REDD+.

In terms of the scale of REDD+, most countries have not considered national and subnational forest definitions in their NRS or the verification, using expert standards, of subnational projects nested into national systems and subnational activities. Countries such as Ethiopia, Ghana, and Sri Lanka have provided national forest definitions, and Ghana has indicated how subnational projects will be nested into national systems, for example, through the Emission Reduction (ER) Program for the Transitional Forest Landscape.

In summary, all the countries have considered the UNFCCC REDD+ design components including activity, scale, MRV, finance, and safeguards in their NRS. However, attention to the key indicators representing these components varies considerably, and this may be due to the national circumstances of the countries. Figure 3 illustrates the level of attention of the countries' NRS to the decisions of the UNFCCC COPs on REDD+. Ghana's level of attention to the REDD+ rules is 95%, followed by Ethiopia (80%), Indonesia, Sri Lanka, and Zambia (76% each), Nepal (62%), whereas Liberia and PNG each registered an attention level of 57%.
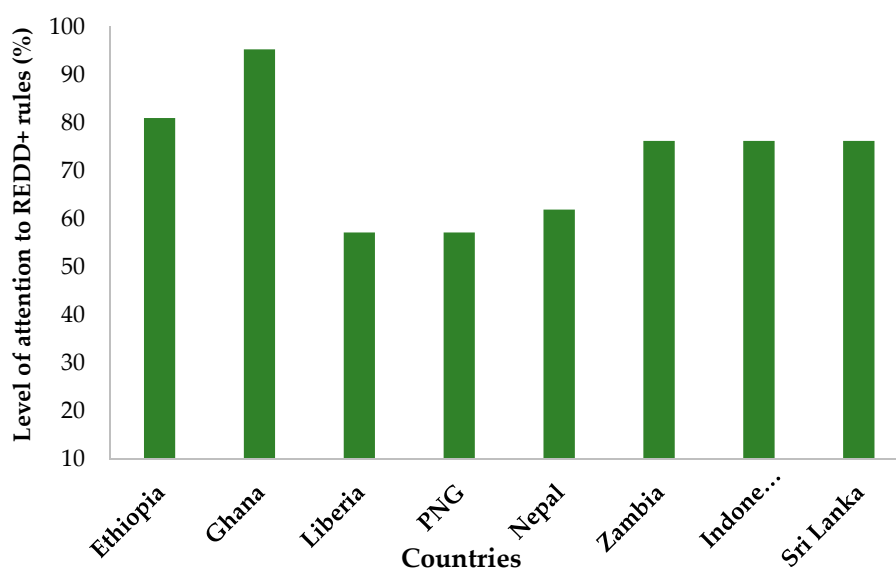

Figure 3. Countries' level of attention to the UNFCCC REDD+ rules based on the NRS.

5. Discussion

Developing countries wishing to receive results-based payment for REDD+ programs need to follow REDD+ processes and rules established by the UNFCCC COPs. With the UNFCCC decision 1/COP 16, developing countries must contribute to climate change mitigation actions in the forest sector by carrying out activities, depending on national circumstances, to reduce emissions from deforestation, forest degradation, the conservation of forest carbon stocks, sustainable forest management, and the enhancement of forest carbon stocks. The Warsaw Framework, which is a recent agreement of the UNFCCC COPs, requests developing countries to develop a NRS, NFMS, FRL, and a SIS to receive results-based payments from REDD+. The NRS, as described earlier, is one of the key outputs from the

REDD+ readiness preparation phase, which guides the developing countries efforts, following the decisions of the UNFCCC COPs, to reduce emissions from deforestation and forest degradation, and to mitigate climate change. This paper set out to contribute to the global REDD+ debates by questioning REDD+ countries' attention and adherence to the UNFCCC COPs REDD+ rules. We recognize that the countries attention and adherence to these rules will vary considerably depending on national circumstances such as governance, capacity, political will, and available resources [15]. However, the national circumstances should not deter countries from developing robust actions and mechanisms for effective, efficient, and equitable REDD+.

Our study demonstrates that, first, all countries have paid considerable attention and adhered to the UNFCCC COPs REDD+ rules (Decision 1/COP 16 and Decision 2/COP 13) relative to the development of actions to reduce emissions from deforestation, forest degradation, conserve forest carbon stocks, sustainably manage forests, and enhance forest carbon stocks. REDD+ cannot be achieved without countries addressing the direct and underlying causes of deforestation and forest degradation. It is important that the countries have identified the key drivers of deforestation and forest degradation and have developed PAMs to tackle them based on extensive stakeholder engagements and consultations. However, as many studies have noted, most developing countries have challenges with technical infrastructure, institutional structures [40], and clear and secure land and forest tenure rights [12] to effectively control the drivers of deforestation and forest degradation and to ensure sustainable forest management. Although REDD+ may provide opportunities to deal with these challenges, developing countries should quickly build their technical and institutional capacities to benefit from the REDD+ mechanism.

Second, from the UNFCCC COPs (decision 2/COP 13), parties define national and subnational forests and indicate which subnational projects are expected to be nested into national systems and which activities will be verified by experts. A clear definition of forests either at the national or subnational levels aids the monitoring process of deforestation and forest degradation and the MVR of emissions fluxes associated with REDD+ implementation. One key component in the development of forest reference levels or forest reference emission levels (FRL/FREL) is the scale. A decision by the COPs of the UNFCCC states that "parties may develop a subnational forest reference emission level as an interim measure while transitioning to national forest reference emission level" [35] (p. 59). The FRELs are critical for receiving REDD+ results-based payments because they serve as benchmarks for assessing a country's performance. Unfortunately, in our study, most countries have not paid attention or adhered to the REDD+ scale component of the UNFCCC COPs, and this can hinder the progress of countries, in particular, when it comes to the MVR of emissions for performance-based payments. Countries should review this gap in the NRS and take necessary action to develop forest definitions that can be applicable and viable for REDD+, considering all the parameters.

Third, the Warsaw Framework of the UNFCCC COPs stipulates that REDD+ activities to reduce deforestation and forest degradation should be monitored, and its emissions, removals, and FRL must be measured, verified, and reported through an established NFMS. Our study revealed that most countries have not yet developed the NFMS but have paid attention to it in the NRS and are following the UNFCCC technical guidelines to develop a robust MRV system. Most REDD+ countries discussion on the MRVsystems are at the explanatory level, and are yet to consider options for its development [15]. Also, most countries have not specified strategies for leakage avoidance and permanence of REDD+. This is because some countries have instituted other national forest policies and programs, from which some of the activities proposed may positively interplay with the global REDD+ rules such as leakage avoidance and permanence. Ghana, for example, implemented the National Bioenergy Policy 2010, which sought to address the sustainability of the supply of fuelwood, and the National Tree Crops Policy, which sought to promote agroforestry practices, biodiversity conservation, and support private initiatives for environmental conservation. In Kenya, activities such as agroforestry, alternative energy sources and public and commercial forest management outlined in the National Forest Act of Kenya have positive interplay with REDD+ rules, in particular, leakage avoidance and permanence [28].

Fourth, REDD+ financing is an important component that developing countries need to pay attention to if they want to achieve emissions reductions. By the UNFCCC COPs decisions (Decision 4/COP 15, Decision 2/COP 17, and Decision 9/COP 19), REDD+ countries must put in place financing mechanisms that ensure the sustainability of REDD+ projects. All countries from our study have specified mechanisms to mobilize and manage funds for REDD+. Ghana has managed to receive over US$ 98 million in commitments to REDD+, and close to US$ 30 million in tangible support of REDD+ from original donors and intermediary institutions [41]. REDD+ countries should realign their financing mechanisms to more effectively address the direct and underlying causes of deforestation and forest degradation to lower emissions from the forest sector.

Finally, REDD+ actions can have a direct and indirect impact on communities that depend on forests for their livelihood and ecosystems. By the UNFCCC COPs decisions (Decision 4/COP 15, Decision 1/COP 16, and Decision 12/COP17/COP19), REDD+ countries need to establish a safeguard system to address the social and environmental impact of REDD+ activities. The countries have turned their attention to this safeguard system and are putting in place mechanisms in line with the UNFCCC safeguard standards to address the potential risks and maximize the benefits of the REDD+ activities. However, countries such as Ghana and PNG have not considered strategies for sustainable development and poverty alleviation, while nearly all the countries have no specified strategies for biodiversity conservation. As argued earlier, some of the countries, apart from the REDD+, have other national forest policies and programs running to ensure sustainable development, biodiversity conservation, and poverty reduction. REDD+ safeguard systems are important if REDD+ is to be effective, efficient, equitable and sustained in developing countries. Therefore, REDD+ countries need to be prompt in the development of strategies to protect communities and ecosystems against any negative impact from REDD+ actions.

6. Conclusions

REDD+ countries cannot progress to implementing REDD+ if the systems and mechanisms for MRV, financing, and safeguards are not in place, or there is no clear definition of national and subnational forests considering the parameters of REDD+ in the NRS. We suggest that first, although the countries have developed key strategies to lower emissions, REDD+ countries need to efficiently move away from the discussion level of developing infrastructure for MRV and safeguards to implementation, if they wish to receive results-based payments and sustain REDD+ projects. Second, countries need to consider implementing other national forest policies and programs that can positively interplay with REDD+ rules such as leakage avoidance, permanence, sustainable development, poverty alleviation, and biodiversity conservation. Finally, REDD+ countries need to pay attention to developing a definition of national and subnational forests to enhance the monitoring of forests and consider projects at the subnational level that can be nested into national systems. In all the eight countries' NRS, the most attention was placed on strategic interventions for addressing the drivers of deforestation and forest degradation to reduce emissions. Countries need to seriously pay attention to and fast-track discussions for the development of MRV systems and other infrastructure necessary for the effective, efficient, and equitable implementation of REDD+.

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