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# How to Achieve Effective Participation of Communities in the Monitoring of REDD+ Projects: A Case Study in the Democratic Republic of Congo (DRC)

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Received: 11 June 2019; Accepted: 10 September 2019; Published: 12 September 2019



**Abstract:** Developing countries that implement the Reducing emissions from deforestation and forest degradation (REDD+) mechanism under the United Nations Framework Convention on Climate Change are required to ensure the effective participation of all stakeholders including indigenous peoples and local communities. Community-based monitoring (CBM) of REDD+ projects could contribute to meeting REDD+ monitoring, reporting, and verification requirements and to ensuring effective community participation. The Democratic Republic of Congo (DRC) is the most advanced country in REDD+ implementation in the Congo Basin region, but the role of forest communities in REDD+ monitoring has not been adequately defined. Based on a Delphi survey, this study aimed to explore the factors that are crucial in achieving effective community participation in the monitoring of REDD+ projects. Out of 65 experts with in-depth knowledge of REDD+ and CBM in the DRC and elsewhere, 35 agreed to participate in the study. In three rounds, 19 feedbacks were received from the first round, 17 from the second and 14 from the third. Data were analyzed in a qualitative (MAXQDA) and quantitative (Microsoft Excel) manner. There was consensus among experts that, per definition, effective participation of communities in the monitoring of REDD+ projects must be a process characterized by a free and prior informed consent (FPIC), recognition of traditional knowledge and community rights, and involvement of communities in all steps of the monitoring process. In practice, the latter point poses several challenges as it requires capacity building, careful selection of indicators, adequate local institutional arrangements and a benefit-sharing system. Ideally, local CBM systems should be nested within the national forest monitoring system, but this will require more strategic efforts at the national level in the DRC, including a framework concept for the role of communities and CBM in REDD+ that can be further adapted to particular circumstances on the ground.

**Keywords:** community-based monitoring; forest; carbon; biodiversity; livelihoods; Delphi study

## 1. Introduction

Tropical forests represent only 10% of the world's land area, but host more than 50% of the world's flora and fauna [1]. They play a significant role in the global carbon cycle, in biodiversity conservation, and in the provision of ecosystem goods and services for millions of people, especially in developing countries [1,2]. For instance, in Africa, forests directly support 60 million rural people who rely on forest resources for their livelihoods, and less directly about 40 million urban people [3]. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), agriculture,

forestry, and other land uses contributed 24% of the global greenhouse gas (GHG) emissions in 2010 [4]. In this context, ongoing deforestation and forest degradation in tropical countries contribute significantly to global GHG emissions and biodiversity loss.

For this reason, tropical forests have been one of the key issues discussed under the United Nations Framework Convention on Climate Change (UNFCCC) during the past decade, where the discussions moved from a pure carbon focus to the recognition of the social and biodiversity importance of these forests [5]. In 2009, the international results-based financial mechanism Reducing emissions from deforestation and forest degradation in developing countries (REDD+) was endorsed to encourage the participation of developing countries in the effort to reduce global GHG emissions. There are five eligible REDD+ activities, namely reducing emissions from deforestation, reducing emission from forest degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks (UNFCCC 2010, decision 1/CP.16).

Many developing countries, including those in the Congo Basin region in Central Africa, have shown interest in this mechanism from the outset, and there are already various REDD+ activities at national and local levels initiated by a wide range of actors such as the government, non-governmental organizations (NGOs) and the private sector. Most of these aim “either to sell carbon credits directly through voluntary markets, or to seek rewards from their governments for contributing to national REDD+ goals” [6] (p. 229). REDD+ projects aiming to sell carbon credits need to adhere to strict rules for carbon assessment and monitoring as laid out by voluntary standards, e.g., by the Verified Carbon Standard. They may also choose to implement additional social and environmental monitoring to comply with the broader standards of the Climate, Community and Biodiversity Alliance (CCBA).

REDD+ projects aiming to contribute to national REDD+ goals need to link up with the National Forest Monitoring System (NFMS), which countries are required to set up in order to access international REDD+ funding (UNFCCC 2010, decision 1/CP.16). The NFMS must include a national system for the monitoring, reporting, and verification (MRV) of carbon for changes in forest area and carbon stocks as outlined in the IPCC Good Practice Guidance [7]. Furthermore, it must include a safeguard information system to address the seven social and environmental safeguards outlined in Appendix A of UNFCCC 2010, decision 1/CP.16. Next to highlighting adequate governance structures and the conservation importance of natural forests, safeguard 2(d) explicitly calls for “ensuring the full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities”. However, there is little guidance on how to achieve this on the ground [8].

Community-based monitoring (CBM) could be a prime opportunity to achieve the effective participation of indigenous peoples and local communities (in the following: communities) in REDD+ activities as required by the UNFCCC. In this study, CBM refers to the involvement of communities in the MRV of carbon and the monitoring of non-carbon benefits in the context of REDD+ projects that may include both governmental and non-governmental initiatives [9]. On the one hand, CBM can complement expert-led carbon MRV that involves field measurements and remote sensing methods, which is considered as one of the costly REDD+ components [10–12]. On the other hand, CBM may contribute to the monitoring of social and environmental safeguards and non-carbon benefits [13]. CBM has potential advantages such as increased community ownership and sustainability of the monitoring system, increased cost efficiency, and enhanced data quality [8,11,14]. However, the degree to which those advantages are realized depends on various factors such as the level of community participation in the monitoring process, the institutional set-up, and the benefit-sharing mechanism in place [9,13,15].

Despite the growing number of REDD+ activities in the Congo Basin region, there is little expertise and information on how CBM can be taken into account in REDD+ projects and the NFMS. The Democratic Republic of Congo (DRC) is the most advanced country in implementing REDD+ in the Congo Basin [16], and includes 61% of the entire forest area in the region [17]. The huge potential of its forest resources puts DRC in a good position for REDD+, in which the country has been officially engaged since 2009 with the aim of reducing emissions from deforestation and improving

local community livelihoods [18]. While the country is currently in the REDD+ investment phase, the role of forest communities in the monitoring of REDD+ projects is not well defined. This study therefore aims at exploring the factors that are crucial in achieving effective community participation in the monitoring of REDD+ projects in the DRC. In particular, the study addresses the following research questions:

1. What are the basic requirements for achieving full and effective community participation in the monitoring of REDD+ projects?
2. Which monitoring scheme and indicators are best suited for CBM of REDD+ projects?
3. What are appropriate incentives and funding sources for sustaining CBM of REDD+ projects?

The study uses a Delphi approach engaging national and international REDD+ and CBM experts. The results highlight expert consensus on how to develop CBM systems in the DRC and point out pending issues that require further research and discussion.

## 2. Materials and Methods

### 2.1. Study Area

Located in central Africa, the DRC is one of 17 megadiversity countries [19], and ranked fifth in the world in terms of animal and plant diversity [20]. With a total land area of 2,345,409 km<sup>2</sup>, the DRC has 155.5 million ha (67%) of forest cover, of which 99 million ha (64%) are dense moist forests [21]. The Congolese forests serve as one of the planet's major terrestrial carbon sinks and support the livelihoods of the majority of the 70 million Congolese citizens, 70% of which live in rural areas [17,22]. Additionally, they provide important revenues for industrial logging companies, although contribution to the country's gross domestic product is insignificant [23].

In the DRC, as in many other tropical developing countries, deforestation and forest degradation are threatening forest biodiversity and undermine the forests' potential for providing ecosystem goods and services. While historical rates of deforestation are relatively low, the current rate of deforestation in DRC is increasing rapidly and is the highest among the countries in the Congo Basin region [22]. The mean annual net deforestation rate increased from 0.22% in the period 2000–2005 to 0.25% from 2005–2010 [18]. Management interventions carried out by local communities are amongst the major direct drivers of deforestation in the DRC (slash-and-burn and shifting agriculture, wood extraction for energy purposes), followed by industrial logging and infrastructure extension [17,21,24].

The REDD+ preparation phase in the DRC (2010–2012) was financially supported by the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (UN-REDD) and the World Bank Forest Carbon Partnership Facility (FCPF). The National REDD Coordination (CN-REDD) is the technical institution under the Ministry of the Environment and Sustainable Development (MEDD) in charge of coordinating the REDD+ process at the national level. In 2012, the country launched its National REDD+ Framework Strategy [18] and established the National REDD+ Fund (French acronym: FONAREDD) that is chaired by the Ministry of Finance and MEDD. Moreover, the country submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC in 2015 (<https://www4.unfccc.int/sites/submissions/indc/Submission%20Pages/submissions.aspx>), aiming to reduce 17% of its GHG emissions between 2021 and 2030. In 2015, the DRC also finalized its REDD+ Investment Plan that was endorsed by the Central African Forest Initiative (CAFI), a donor coalition supporting the six Congo Basin countries [25].

At the time of study, around 15 REDD+ projects were being implemented in the DRC involving a wide range of actors, such as international and national NGOs, the private sector and academic institutions [26]. They included pilot projects funded by the Congo Basin Forest Fund (CBFF) as well as private pilot projects [26,27]. These projects were completed by activities under the Forest Investment Program (FIP) funded by the African Development Bank (ADB) and the World Bank and integrated REDD+ programs at the provincial level supported by CAFI [16,28]. In addition, the DRC

was preparing for the implementation of the Emission Reductions (ER) program in the Mai-Ndombe province under the FCPF [16]. All major funding initiatives (UN-REDD, FCPF, CAFI, FIP) consider local rights and livelihood issues [16] and would thus be suited to endorse CBM approaches.

Despite the international support and the relatively advanced stage in the REDD+ process, REDD+ implementation in the DRC is challenged by civil conflicts as well as low levels of institutional and technical capacity at national and local levels, which impedes the implementation of public policies and programs [16,26]. Moreover, the decentralization process stipulated by the 2006 constitution has progressed slowly and created conflicts between central and local governments over the sharing of benefits from natural resources, including from forestry and mining [17,26].

## 2.2. Delphi Technique

This study used the Delphi technique, a method that helps to “obtain the most reliable consensus of opinion of a group of experts by a series of intensive questionnaires interspersed with controlled feedback” [29] (p. 458). Initially introduced as a forecasting tool in the scientific study of expert opinions on military defense projects by the U.S. Rand Corporation in the 1950s [30,31], the Delphi technique is today applied in a broad range of disciplines where complex problems are addressed, e.g., environmental sciences and climate change [32], forest governance [33,34], and biodiversity conservation [35].

We selected the Delphi method because multiple feedback rounds allow for a more intense expert engagement than other interview techniques. This is particularly useful when aiming to resolve complex issues such as the requirements related to the full and effective participation of communities in the CBM of REDD+ projects with possibly diverging expert opinions. The anonymous feedback rounds enable a learning and consolidation process amongst the experts, while avoiding social pressure and influence that could affect experts willing to revise their initial judgments for the purpose of attaining consensus [35,36]. Also, the method permits weighing expert statements by level of agreement. The Delphi technique offers other advantages such as the opportunity to work with a small group of experts with a recognized professional background and experience related to the topic, and no face to face interviews are required.

## 2.3. Expert Selection

The Delphi technique depends on expert selection according to well-defined criteria [35]. An expert is considered as “someone who possesses the relevant knowledge and experience and whose opinions are respected by fellow workers in their field” [37] (p. 640). In this study, experts had to meet at least one of the following criteria:

1. The expert must have experience and knowledge in the field of REDD+ and CBM, including familiarity with the requirements for the monitoring of REDD+ activities.
2. The expert must be involved in the implementation of a REDD+ project in the DRC or elsewhere.
3. The expert must have established a reputation through publications related to CBM and/or REDD+.

In total, 65 professionals from various institutions and backgrounds were identified as potential respondents through their publications, well-known networks, and expert recommendation. In September 2015, these experts were invited to participate in this Delphi study via e-mail with a letter providing details on the project objectives, the number of rounds and the timeline. The invitation letter was accompanied by the project proposal for additional information. 35 experts agreed to participate in the study (in the following: participants). However, the pool of respondents dropped to 19 in the first round, 17 in the second round, and 15 in the third round.

The participants represented a broad range of stakeholder groups, which contributed to the credibility and representativeness of the panel results (Table 1). They all had university degrees (Bachelor, Master, PhD), an average of six years of experience with REDD+ and CBM, and were from eight countries: Cameroon, Denmark, DRC, France, Germany, Peru, UK, and USA. Though gender

balance was not a criterion of selection, men dominated the panel, while only three women participated in the study. Ten of the participants in the final round were directly involved with REDD+ activities in the DRC.

**Table 1.** Number of participants in the three rounds of the Delphi study by stakeholder group. Local expertise (LE) refers to the number of experts in each group that had experience on the ground regarding REDD+ project implementation and community involvement in the DRC or elsewhere.

Stakeholder Group	LE	Round 1	Round 2	Round 3
National governmental institutions in DRC	2	2	2	2
International governmental cooperation	0	1	1	1
Private sector (project developers)	1	2	0	0
National NGOs (DRC)	2	2	2	2
International NGOs with activities in the DRC	2	2	2	2
International NGOs without activities in the DRC	0	1	1	0
Researchers and university staff working on REDD+ issues with communities	2	6	6	6
Independent consultant with experience with REDD+ and communities in the DRC and Congo Basin region	1	1	1	1
UN organization involved in the REDD+ process in the DRC	1	1	1	0
Regional technical body involved in the monitoring of forest area in the Congo Basin region	1	1	1	1
Total number of participants	12	19	17	15
Male	11	16	14	12
Female	1	3	3	3

#### 2.4. Data Collection and Analysis

The questionnaire in the first round consisted of open-ended and closed questions to collect general and free opinions from the participants regarding the full and effective participation of communities in the monitoring of REDD+ projects in the DRC. The questions were developed based on a review of literature in the fields of participatory monitoring, CBM, REDD+ monitoring, and REDD+ project implementation in the DRC and worldwide. Major questions referred to the definition and requirements for full and effective participation in the context of CBM, the proposed level of community involvement following Danielsen et al. [15], possible monitoring indicators, and incentives for community participation (Supplementary Material SM1).

The second-round questionnaire (Supplementary Material SM2), developed from information gathered from the first round, was more structured and focused on topics that had received heterogeneous statements in the first round, while the third round questionnaire (Supplementary Material SM3) focused on statements with weak or lack of consensus in the second round. The respondents were asked to provide their own personal opinions rather than representing the official position of their organization. Questionnaires were sent out in English and French, and all French replies were translated into English by J. Mukungu.

The three rounds were covered in a period of six months (September 2015–April 2016). The data were analyzed using a mixture of qualitative (MAXQDA) and quantitative (Microsoft Excel) approaches. A five-point Likert scale was used in the second and third round questionnaire to express in percentage the agreement in the panel as follows:

- 1 (strongly disagree),
- 2 (disagree),
- 3 (neither agree nor disagree),



- 4 (agree),
- 5 (strongly agree).

The first round revealed a high level of diversity in the participants' personal opinions, which encouraged us to establish the level of consensus (percentage of respondents scoring an item as 4 or 5 on the Likert scale) as follows:

- Strong consensus ( $\geq 70\%$ ),
- Moderate consensus (69–60%),
- Weak consensus (50–59%), and
- Absence of consensus (0–49.9%).

### 3. Results

The results section shows the evolution of the participants' opinions from the general questionnaire in the first round to more specific questions in the last two rounds. Indeed, the second and third round questionnaires were organized around seven aspects of participation that had received heterogeneous feedback in the first round and required a consensus from the group:

1. Definition of full and effective participation,
2. Prerequisites for CBM,
3. Suitable monitoring schemes for CBM,
4. Funding sources for CBM,
5. Incentives for CBM,
6. Focus of CBM, and
7. Suitable indicators for CBM.

While consensus was easily established on some points, this was not possible for others, for instance on suitable indicators for CBM of REDD+ projects in the DRC. Overall, the results reveal that the participants' points of view were strongly influenced by their experience on the ground (see Table 1). In fact, the participants often justified their statements by mentioning "from my experience" or "from what I saw in community xx or country xy".

#### 3.1. Definition of "Full and Effective Participation" of Communities in the Monitoring of REDD+ Projects in the DRC

The first round questionnaire revealed that "full and effective participation" was perceived by participants as a process that encompasses different components. The individual statements were grouped and summarized in five main elements (Table 2). In the second and third round, we assessed the level of consensus amongst participants regarding the importance of these elements for the general definition of full and effective participation of communities in the monitoring of REDD+ projects in the DRC.

There was strong consensus amongst participants on the inclusion of free, prior and informed consent (FPIC), recognition of traditional knowledge and community rights, as well as involvement of community members in all steps of the monitoring process in the definition. Yet there was only moderate consensus on the statement that technical capacity building per se should form part of the general definition. Moreover, there was weak consensus on the statement that a systematic engagement, i.e., a comprehensive formal consultation process, with all local authorities and community groups should be part of the definition. Roughly one-third of the participants (29%) neither agreed nor disagreed with this statement, while 18% clearly disagreed with having it as part of the definition of full and effective participation of communities in the monitoring of REDD+ projects. This statement was the only one with weak agreement, so it was revisited in the third round. A lack of consensus then emerged on taking into account this statement as relevant to the definition in the context of this study (47%), with 27% of the participants disagreeing and 27% remaining neutral.

**Table 2.** Elements in Delphi panel results defining the process of full and effective participation of communities in the monitoring of REDD+ projects in the DRC.

Elements of the Participation Process as Stated by Participants in the First Round	Second Round Consensus	Third Round Consensus
Free, prior, and informed consent (FPIC) of community members	Strong (100% agreement)	-
Recognition and consideration of traditional knowledge and community rights	Strong (82% agreement)	-
Involvement of community members in all steps of the monitoring process (design of monitoring program, data collection analysis and interpretation, decision making on the use of the data in forest management)	Strong (71% agreement)	-
Appropriate training of community members in monitoring methodologies (capacity building)	Moderate (65% agreement)	-
Systematic engagement with local authorities (customary and administrative) and all different groups in the community, including gender aspects	Weak (53% agreement)	No consensus (47% agreement)

Most of the participants argued that there was a difference between “the monitoring process”, which is an activity that requires a “team” for implementation on the ground, and the “information and consultation process” that should reach all community members in question (local authorities, women, youth, etc.). In fact, they argued that this aspect was already taken into account in the FPIC process, and that there was no need to include the fifth element in the definition.

### 3.2. Relevance of Prerequisites in the Participation of Communities in the Monitoring of REDD+ Projects in the DRC

Participants were asked if there were any prerequisites that needed to be met prior to engaging communities in the monitoring of REDD+ projects. Data from the first round revealed two tendencies among participant opinions: Those who thought that prerequisites were relevant to facilitate the engagement of communities in the monitoring process of REDD+ projects, and those who thought prerequisites were not relevant as the monitoring task in itself is a long-term process. All statements were summarized in four prerequisites and the level of agreement tested in Delphi panel rounds two and three (Table 3).

**Table 3.** Prerequisites in Delphi panel results for the full and effective participation of communities in the monitoring process of REDD+ projects in the DRC.

Prerequisites as Stated by Participants in the First Round	Second Round Consensus	Third Round Consensus
Clear information system through free, prior, and informed consent (FPIC)	Strong (77% agreement)	-
Local institutional arrangement to support the participation of community members in the monitoring process	Strong (71% agreement)	-
Capacity building (training) system for monitoring technologies	Moderate (65% agreement)	-
Community land-use planning and secure tenure	Weak (53% agreement)	No consensus (33% agreement)
The above elements cannot be considered as prerequisites for the participation of communities in the monitoring process, but rather as an integral part of the monitoring process itself	No consensus (29% agreement)	No consensus (33% agreement)

In round two, roughly 75% of the participants agreed that FPIC and local institutional arrangements can be considered as prerequisites for the full and effective participation of communities in the monitoring process of REDD+ projects in the DRC. However, land-use planning and tenure security were thought to be unrealistic as prerequisites because these could only be achieved over time. It also turned out that around 33% of the participants thought that the definition of prerequisites was not required.

### 3.3. Appropriate Monitoring Scheme for CBM of REDD+ Projects in the DRC

In a next step, participants were asked to assess the appropriateness of five different levels of local participation in the monitoring of natural resources in developing countries as defined by Danielsen et al. [15]. The first round results (Appendix A) were summarized and re-evaluated in rounds two and three (Table 4).

**Table 4.** Delphi panel results on the recommend monitoring scheme for community-based monitoring of REDD+ projects in the DRC. Categories (Cat.) according to Danielsen et al. [15] in the order of increasing community participation in the monitoring process.

Statements and Level of Agreement (%) Derived from first Round (see Appendix A and Supplementary Material)	Second Round Consensus	Third Round Consensus
Cat. 1: Totally externally driven, professionally executed monitoring is <u>not recommended</u> (79%), except when communities have nothing to do with the project, or are not affected by it	Moderate (65% agreement)	-
Cat. 2: Externally driven monitoring with local people participating only in data collection is <u>not recommended</u> (42%)	Weak (59% agreement)	Strong (100% agreement)
Cat. 3: Collaborative monitoring with local people participating only in data collection and management-oriented decision making while data analysis and interpretation are done by external experts is <u>recommended</u> (37%), but not ideal	No consensus (47% agreement)	No consensus (33% agreement)
Cat. 4: Collaborative monitoring with local people participating in all steps of the monitoring, including data analysis and decision-making, with external experts giving advice is <u>highly recommended</u> (68%)	Moderate (65% agreement)	-
Cat. 5: Autonomous local monitoring without direct intervention of external agencies is <u>not recommended</u> (63%). However, it could be an ideal scheme in the future if community members possess all the required skills.	Moderate (65% agreement)	-

The analysis revealed diversion in participant opinions on this question. However, a moderate consensus was established that in the context of this study the monitoring scheme should be a collaborative one, with community members participating in all steps of the monitoring process with external experts giving advice (Cat. 4). The other schemes, especially an externally driven scheme with community members participating only in data collection (Cat. 2) were not recommended in the context of this study.

We understood from the participants' written comments that participation of community members in all steps of the monitoring process would be ideal, but that on-the-ground reality may not always allow this to happen. In fact, based on their local expertise, some of the participants emphasized that the interest of community members in the monitoring would determine the kind of scheme to be defined. For instance, a participant strongly in favor of the participation of community members in all steps of the monitoring process mentioned however that, based on his experience with CBM, "there is a difference between ideal and reality on the ground, as in some cases communities will not be able to or want to participate in all steps". This opinion was shared by other participants. For instance, one argued that "there will be some communities where there is a lot of interest in the data and who will



want to use it themselves, others where they may be happy to collect the data, especially if paid to do so, but who may have little interest in how it is used. I think to expect that communities can do the statistical analysis is however in almost all cases unrealistic." Another participant argued that "we agree to have a monitoring scheme that involves community members in data collection and decision making in forest management. As for data interpretation, we are convinced that, it must be done by external experts, especially, the one implementing the REDD+ project".

#### 3.4. Which Aspects of REDD+ Projects Can be Monitored by Communities in the DRC

In the first round, participants were unanimous in saying that, if well trained, communities are able to monitor all benefits from the implementation of a REDD+ project, i.e., carbon and non-carbon benefits. However, there was a trend in the opinions that some form of REDD+ benefits was more suitable for CBM than others (Table 5, column 1).

**Table 5.** Delphi panel results on the suitability of different REDD+ benefits for CBM of REDD+ projects in the DRC.

First-Round Results on the Ranking of REDD+ Benefits According to Their Suitability for CBM	Second Round Consensus	Third Round Consensus
Socio-economic benefits in the first position	Strong (76% agreement)	-
Biodiversity in the second position	Weak (59% agreement)	-
Other non-carbon benefits in the third position	Weak (59% agreement)	-
Carbon in the last position	No consensus (47% agreement)	-
A minority of the participants did not agree at all with this arrangement, seeing in it a source of potential conflicts between communities and those implementing the projects.	No consensus (6% agreement)	Weak (53% agreement)

Results from the second round reveal a strong consensus that the monitoring of socio-economic benefits could be the most easily achieved by CBM of REDD+ projects. Most participants assumed that socio-economic data can be collected, analyzed, and interpreted by local communities, although privacy issues may occur if community members do not want to disclose personal data to their peers. However, a minority of the participants (6%) emphasized that a pre-arranged preference of what can or cannot be monitored by communities was not the right way to go, as this could be a source of potential conflicts between stakeholders and a door to exclusion in other activities. As the opinion of a minority is an important element in a Delphi study, the question was reformulated in the third round to find out if ranking the suitability of different REDD+ benefits for CBM is a useful approach. Finally, 53% of the participants agreed that the definition of which benefits were suitable for CBM must not be pre-established. Instead many argued that analysis should be done considering the real situation on the ground according to specific and necessary information in the context of each REDD+ project in the country.

Overall, opinions remained very diverse as can be seen from the relatively low levels of agreement. For some participants it was unrealistic to task communities with very technical aspects regarding the monitoring of carbon stocks, while for others carbon was the simplest aspect to monitor, as one of the participants argued that "it must be acknowledged that even experts have difficulty in accurately monitoring biodiversity and non-carbon benefits. Carbon remains the most straightforward aspect of REDD+ to monitor. It is also the aspect of REDD+ that is most closely correlated with the underlying objective of REDD+, which is emissions reduction to mitigate climate change". Another participant argued that "biodiversity and non-carbon benefits have more effects on community livelihoods than carbon. Carbon is an intangible resource and requires more sophisticated spatial technology to monitor", thus implying that biodiversity and other non-carbon benefits were more suitable for CBM.

### 3.5. Incentives to Engage Community Members in the Monitoring Process of REDD+ Projects in the DRC

The open question in the first round yielded different ideas from participants on what could be incentives to engage community members in the monitoring of REDD+ projects in the DRC (Table 6).

**Table 6.** Delphi panel results on incentives to engage community members in the monitoring process of REDD+ projects in the DRC.

Statements Derived from the First Round	Second Round Consensus	Third Round Consensus
Community member involvement in the monitoring of REDD+ projects should be based on payment (salary) for the individual directly involved in the monitoring process, such as per diems for their travel costs.	Weak (53% agreement)	No consensus (33% agreement)
Community member involvement in the monitoring of REDD+ projects should be based on other forms of incentives that will benefit the whole community, such as social infrastructure development projects (electricity, clean drinking water), secure land tenure, or scholarships for children.	No consensus (47% agreement)	No consensus (40% agreement)
Community member involvement in the monitoring of REDD+ projects should ideally be voluntary.	No consensus (41% agreement)	No consensus (13% agreement)
Community member involvement in the monitoring of REDD+ projects should be adapted to the local context and customs. For instance, if members in a community are used to being paid for their participation in a project's activities, then they must be paid for their participation in the monitoring process.	Weak (53% agreement)	Moderate (60% agreement)

Participant opinions on this question were very heterogeneous. Agreement was weak or absent from the second to the third round for all the statements, except for the one suggesting that incentives should be adapted to the local context and customs. In fact, from a weak consensus in the second round, this statement reached a moderate consensus in the third round. While some participants argued that "individual payment will create conflicts, competition and erode cooperation", others argued that "it is important to remunerate individuals who provide work for the MRV. It is first of all the recognition of the value of the work they provide and their difficult socio-economic conditions ... but also a way to inject cash in the local economy and provide some relief before the longer term impact of REDD+ activities can be felt.", and "volunteering will not be effective".

### 3.6. Source of Funding to Sustain CBM Activities in the DRC

Even though it was recognized that CBM is cost efficient, a source of funding to support its implementation in a sustainable way must be identified. As many stakeholders are involved in a REDD+ project, participants were asked about their opinion on the appropriate source of funding. In the first round, diverse opinions were collected, summarized, and put forward for assessment in round two (Table 7, Supplementary Material SM2).

The second round showed clearly that for CBM of REDD+ projects to sustain a diverse source of funding is preferable depending on the reality at the project level and arrangements from the national program.

**Table 7.** Delphi panel results on possible funding sources for the monitoring of REDD+ projects in the DRC.

Statements Derived from the First Round	Second Round Consensus	Third Round Consensus
Money for CBM should come from all sources: REDD+ project developers, national REDD+ program funds, local, national or international NGOs, depending on who is implementing the REDD+ project and the way it is set up.	Strong (82% agreement)	-
Money for CBM should come from national REDD+ program funds only, since REDD+ is a national process, and these funds have political legitimacy and could be a sustainable funding source if well managed, including a benefit-sharing mechanism.	No consensus (35% agreement)	-
Money for CBM should come from project developers, especially up-front.	No consensus (6% agreement)	-
Money for CBM should come from REDD+ payments (mainly carbon credits), especially to cover long-term operational costs.	No consensus (47% agreement)	-

### 3.7. Suitable Indicators for Each Benefit Monitored Through CBM

From the first round (see Section 3.4), participants were unanimous in their opinion that community members were able to monitor (data collection, analysis, and interpretation) all types of benefits from a REDD+ project if well trained. In the second round, participants were asked about their opinion on what kind of indicators should be developed in order to facilitate CBM activities. The results reveal that most participants were not comfortable with this question for diverse reasons: 59% could not answer because they found the question unclear, or thought it was not appropriate to respond to the question without sufficient knowledge of the specific situation on the ground in the DRC. The remaining 41% identified the following specific indicators:

1. Biodiversity: reduction in or disappearance of poachers, species stock assessment, variation in density and diversity (e.g., fauna and flora threatened with extinction), documenting fishing and hunting activities
2. Socio-economic benefits: number and quality of infrastructure in the project area, number of families that have improved their livelihood/well-being, presence of alternative livelihood activities, number of families that have improved their income (income generating activities), number of families that have access to clean water and medical care (children in particular)
3. Carbon: increase in forest areas under community conservation, forest cover, extension of fields and increase in number of new fields, forest canopy/density

## 4. Discussion

The results of the Delphi survey show that there is no one-size-fits-all solution to the complex question of how to achieve the full and effective participation of communities in the monitoring of REDD+ projects in the DRC. While it was possible to achieve strong consensus on theoretical aspects such as the definition of and prerequisites for full and effective participation, issues related to the actual implementation of a CBM system on the ground were viewed quite differently by different experts, especially with regard to local incentive and payment systems. This underpins the usefulness of the Delphi approach in exploratory studies seeking to highlight areas of consensus as well as areas of dissent for further research and discussion [32,35]. In fact, the experts themselves entered a learning and reflection process throughout the Delphi survey. For instance, the initial minority statement that it is not useful to rank the types of benefits that can be monitored by communities (Table 6) was endorsed by 53% of the participants in the third round. Participants also reconsidered and adjusted their views on the kinds of incentives for community members to engage in CBM (Table 7), moving away from a particular incentive type to the insight that incentives need to be adapted to local context and customs.

It became obvious that experts perceived a mismatch between the theoretical scope and benefits of CBM and the complex situation on the ground characterized by diverse interest groups and actors. In this regard, a limitation of our study lies in the fact that we were not able to include field-based experts and community members in this desktop survey, which relied on e-mail communication. However, considering the diversity of local communities and REDD+ projects in the DRC, individual case studies rather than a broad survey would be a crucial next step in further conceptualizing and implementing the CBM approach, and this is also recommended for other REDD+ countries [38]. In the following, we discuss different aspects of CBM in more detail.

#### *4.1. Basic Requirements for Achieving the Full and Effective Participation of Communities in the Monitoring of REDD+ Projects*

Participants strongly agreed that there are three important elements characterizing the full and effective participation of communities in the monitoring of REDD+ projects in the DRC: (1) FPIC, (2) recognition and consideration of traditional knowledge and community rights, and (3) involvement of community members in all steps of the monitoring process (Table 2). These elements highlight that CBM should strive to consider communities as actors at eye level who have specific needs and rights. The first two elements can be considered as crucial also for the full REDD+ implementation process in the DRC at local and national levels [28]. FPIC enables communities to take informed decisions about their participation in REDD+ projects and CBM, and was therefore not only considered as part of the definition but also as prerequisite for full and effective participation (Table 3). In fact, FPIC is recognized in the national REDD+ strategy [18], but up until now there is a lack of more specific provisions for its implementation at the local level [39].

Capacity building for communities was highly valued by the participants, yet this received only moderate consensus on inclusion in the definition or as a prerequisite. This is because capacity building was considered more of a technical issue relevant only for those community members that participated in the actual monitoring activities. In contrast, participants strongly agreed that local institutional arrangements were a crucial prerequisite to facilitate the full and effective participation of communities in all steps of the monitoring process. This notion is supported by studies from other REDD+ countries, including Cameroon and Tanzania, which also emphasize the importance of objective local information and consultation processes [40,41]. Together, FPIC and local institutional arrangements can provide the basic requirements of an effective participation system—i.e., information exchange, access to decision making, and implementation powers [42]. Yet it also needs to be ensured that a representative number of community members and community groups is actually participating [43].

Danielsen et al. [8] recommend that national level REDD+ programs recognize and define the specific tasks and responsibilities of national staff, project managers, and community members in the context of CBM, including procedures on data collection, verification, and analysis. The DRC national REDD+ strategy [18] encourages participatory and community-based natural resource management and stipulates the creation of Local Development Committees (LDC) that are supposed to underpin the representation of traditionally marginalized groups, such as youth, women, migrants, and indigenous peoples. However, it does not provide guidance on possible CBM arrangements. The LDC that are currently being set up by REDD+ projects in the DRC are made up of representatives chosen by the communities themselves to organize activities in and with a community [44], and could provide the local institutional back-up for CBM systems. However, such committees are prone to mirror local power structures, and possibly elite capture, if they are not carefully set up [39].

Synergies could be created between the local institutional arrangements for REDD+ and the emerging community forests in the DRC, but those processes are characterized by similar challenges. Local community forests have been acknowledged in the DRC forestry law since 2002, but only in 2014 was the concept sufficiently defined to facilitate formal recognition [45,46]. The Ministerial Order 025 requires the establishment of a community assembly, a management committee, a local control committee, and a council of elders. While these structures are supposed to ensure cross-control, fair

benefit-sharing and local conflict resolution there is the danger that, similar to the LDC, the groups that are generally excluded from traditional power will not be adequately represented, as was shown for Gabon for example [45,46]. Setting up four institutional structures is also deemed costly and possibly inefficient [46]. Moreover, political corruption and civil conflict at the local level are major challenges for implementing new governance structures in the DRC [16].

As the socio-economic set-up of communities, including rights and influence of community members as well as REDD+ related knowledge and interests can vary greatly [39,47], it could be a way forward to establish general guidelines for local institutional arrangements that provide some flexibility for adaptation in individual intervention areas [46]. With regard to CBM, the role of LDC and other local institutions will also depend on the type of monitoring and benefit-sharing system selected for implementation (see below).

Finally, next to functioning local institutions, tenure security is a crucial requirement for enabling community participation under REDD+ [38,48]. However, participants did not reach a consensus on the inclusion of secure tenure as a prerequisite for CBM in the DRC because this issue was considered as a lengthy and cumbersome process, which is also the case in other REDD+ countries worldwide [49,50]. Other studies highlight the importance of resolving land-tenure issues especially for marginalized groups within the community (e.g., women, indigenous people), while underlining the difficulties related to this task in the DRC with competing state and customary forest tenure systems [44,47,51].

#### 4.2. Monitoring Scheme and Indicators

The questions around monitoring scheme, criteria, and indicators for CBM of REDD+ projects revealed a high heterogeneity of expert opinions. This underlines the fact that monitoring schemes and criteria have to be adapted to the particular project and communities in question. The experts generally dismissed the notion of externally driven (Cat. 1) as well as autonomous local monitoring schemes (Cat. 5) (Table 4). Collaborative monitoring with external data interpretation (Cat. 3) was favored by only few experts, while collaborative monitoring with local participation in all steps of the monitoring process (Cat. 4) was highly recommended with moderate consensus. This is a small deviation from the expert-based definition of full and effective participation where involvement of community members in all steps of the monitoring process was endorsed with strong consensus (Table 2). This slight difference reveals that in theory full community participation is considered ideal, but reality on the ground may not always allow for implementing this scheme.

The preferred monitoring scheme also depends on the underlying purpose of implementing CBM. If CBM is merely considered as a tool for achieving better REDD+ outcomes at lower cost, project monitoring schemes with strong involvement of external experts (Cat. 2, 3) might be best suited [39]. They bear the advantage that design and indicators can be more easily standardized to inform national and international monitoring needs [15]. Besides, it is easier for external experts with a formal education to conduct, analyze, and interpret assessments in a way that these fulfil REDD+ credibility requirements [8]. This was a point of view held up by some of the participants who doubted that data analysis and interpretation can be carried out by the communities, or that all communities have the motivation to participate in the monitoring process.

If CBM is to contribute to the full and effective participation of communities in REDD+, collaborative monitoring schemes with involvement of local communities in all monitoring steps (Cat. 4) are vital because they support community participation in REDD+ project design, implementation and management decisions [8,39]. Yet again, collaborative monitoring schemes are not necessarily cheaper than expert-based monitoring because they involve costs for capacity building, local workers, and community organization [8]. Additionally, they require facilitators that ensure the compliance of community monitoring with REDD+ project standards and/or the NFMS, as local communities mostly do not have the capacity to oversee national and international monitoring requirements [38]. For this reason, experts in this study agreed that fully autonomous monitoring schemes (Cat. 5) are difficult to establish under REDD+. Ideally, CBM would consist of a set of externally designed indicators that can



inform national and/or international monitoring schemes, and a set of indicators designed to meet local community needs and project-specific objectives and requirements [12,52,53].

During the three Delphi rounds, participants entered a reflection process, and finally came up with the consensus that community members should not be limited to a pre-established list of what they need to monitor or not. This opens up the opportunity for developing project-specific indicators in a participatory way that may also build on traditional knowledge. Few of the experts felt themselves in a position to recommend specific indicators because at the time of the study CBM was only just starting in the DRC through a Community Monitoring, Reporting and Verification (CMRV) system in the Mai-Ndombe province, which was developed with local communities and takes into account environmental and social criteria [54]. External experts and community members selected by LDCs jointly collect and analyze data using mobile devices, satellite data, and GIS systems. There is no formal evaluation of this initiative yet, but it adds to the existing evidence that CBM can provide reliable data on carbon stocks [8,11,55] as well as biodiversity, ecosystem services, and socio-economic benefits [56,57] with details that are missed through remote sensing or national forest inventories [11]. However, most studies only demonstrate community involvement in data collection, while there are only few examples of community participation in the REDD+ reporting and verification process [13].

#### *4.3. Incentives and Source of Funding to Sustain CBM Activities*

The participants had diverse opinions on the incentives required to engage communities and community members in the monitoring of REDD+ projects. Throughout the three Delphi rounds, agreement on a particular kind of incentive decreased, while the level of consensus on adapting incentives to local context and customs increased (Table 6). While volunteering was certainly ruled out as an option, the question whether community members should be paid directly or the whole community should receive benefits needs to be evaluated carefully for individual projects. This will also depend on the type of monitoring scheme, since the higher the level of community involvement, the more likely it is that a more complex benefit-sharing system needs to be established [8,49]. However, care needs to be taken to rule out that benefit-sharing mechanisms merely benefit those with power in communities (“elite capture”) [44,47]. Generally, REDD+ countries fall short in defining the role of local institutions in the sharing of REDD+ benefits highlighting the challenge related to this task [58].

Moreover, it must be acknowledged that individual communities and community members can have diverging motivations for participating or not participating in CBM. It is thus crucial to conduct consultations in each area of intervention to clarify community interests, and the potential community benefits from different CBM systems [38]. Participation in REDD+ village meetings in the DRC was most strongly motivated by per diems, followed by receiving information and finally participation in decision-making [39]. Internationally, the legal recognition of land rights and/or the clarification of local tenure arrangements are strong incentives for communities to participate in REDD+ activities and CBM [59], which can be underpinned through participatory mapping of natural resources distribution and use patterns [38,60].

There was strong agreement amongst experts that the funding for CBM activities should come from different sources such as national REDD+ program funds as well as REDD+ project developers depending on the particular type of REDD+ project. In the DRC, a wide range of international organizations developed REDD+ projects and financial support communities with training and equipment for monitoring activities. However, the projects are limited in time, and cannot provide the long-term funding sources required to sustain CBM for REDD+ in the DRC. This is a major limitation, and bears the risk that communities merely perceive CBM activities as a short-term intervention driven by external actors. Resolving these financial issues is a major challenge. On the one hand, it is crucial to strive for the formal recognition of CBM at the national level, due integration in the NFMS, and allocation of specific funds, while on the other hand, carbon credits, and developing value chains for sustainably sourced forest products may generate long-term support. In this regard, the cooperation between REDD+ and community forestry proponents in the DRC would be a way forward [46].

## 5. Conclusions

The results of this study show that implementing CBM of REDD+ projects in the DRC requires individual local solutions, and this certainly also holds true for other REDD+ countries. While consensus on the definition of full and effective participation and the prerequisites of CBM was quite easily established, experts highlighted a range of possible monitoring schemes, incentives, and funding sources. It is thus crucial that the development of CBM systems is informed by local consultation processes that explore the interests and motivation of individual communities and community members, also considering community organization and power structures. While there is currently little consideration of CBM in the DRC national REDD+ strategy, it is paramount to develop a nested NFMS that relies on expert-based monitoring of parameters at the national level—e.g., using remote sensing techniques—complemented by information from CBM systems. This study shows that CBM systems with strong community involvement can certainly contribute to the full and effective participation of communities in the overall REDD+ process.

With the recent signing of the ER Payment Agreement for the Mai-Ndombe province, the DRC has moved forward to the investment phase of the REDD+ mechanism. The current (2019) consultation process for developing the benefit-sharing plan under this agreement is also tasked with developing a blueprint for sustainable local institutional arrangements that can constitute a role model for other regions in the DRC. We believe that our findings can contribute to this ongoing discussion process amongst stakeholders involved in the implementation of REDD+ at the national level and in projects on the ground. Furthermore, we encourage integrating the development of CBM under REDD+ more strongly with the emerging community forestry initiatives in the DRC. First examples of CBM systems in the Mai-Ndombe province show that despite the pending political, structural, and financial hurdles, there is a good chance for further development and implementation of this system in the DRC.

**Supplementary Materials:** The following are available online at <http://www.mdpi.com/1999-4907/10/9/794/s1>, SM1: First round questionnaire, SM2: Second round questionnaire, SM3: Third round questionnaire.

**Author Contributions:** Conceptualization, J.M. and C.B.S.; Methodology, J.M. and C.B.S.; Formal analysis, investigation, and data curation, J.M.; Writing—original draft preparation, J.M. and C.B.S.; Writing—review and editing, C.B.S.; Project administration, J.M. and C.B.S.; Funding acquisition, J.M. and C.B.S.

**Funding:** This study was funded by the Alexander von Humboldt Foundation Climate Fellowship program with additional support from the Maria von Linden program and the Center for Development Research (ZEF), both University of Bonn, Germany. The article processing charge was paid by the German Research Foundation (DFG) and the University of Freiburg (funding program: Open Access Publishing).

**Acknowledgments:** We would like to thank the 19 anonymous experts for their substantial contribution to this study. We also acknowledge the helpful comments of Manuel Boissière, Denis Sonwa, Sufo Kankeu Richard, and Eva Youkhana on an earlier version of this manuscript, as well as the feedback from two anonymous reviewers.

**Conflicts of Interest:** The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

## Appendix A

**Table A1.** First round Delphi panel results on the appropriate monitoring scheme for community-based monitoring of REDD+ projects in the DRC.

Participatory Monitoring Approaches According to Danielsen et al 2009 [15]	Panel Assessment				
	Highly Recommended	Recommended	Fair	Not Recommended	No Data
Cat. 1: Externally driven, professionally executed monitoring. (No involvement of communities at all)	6% agreement	5% agreement	5% agreement	79% agreement	5%
Cat. 5: Autonomous local monitoring. (Local people carry out the whole monitoring process without direct involvement of external agencies)	-	16% agreement	16% agreement	63% agreement	5%
Cat. 4: Collaborative monitoring with local data interpretation. (Local people participate in data collection, analysis or interpretation, as well as decision making about the management of the resources. Scientists provide advice and training)	68% agreement	10% agreement	11% agreement	11% agreement	-
Cat. 3: Collaborative monitoring with external data interpretation. (This scheme involves local people in data collection and decision making, but the design of the scheme, data analysis, and interpretation are done externally)	21% agreement	37% agreement	21% agreement	21% agreement	-
Cat. 2: Externally driven monitoring. (Local people participating only in data collection)	10% agreement	16% agreement	21% agreement	42% agreement	11%

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