



**HAL**  
open science

## Reprint of "Governing knowledge transfer for deforestation monitoring: Insights from REDD+ projects in the Congo Basin region"

Richard Sufo Kankeu, Moise Tsayem Demaze, Max Krott, Denis Jean Sonwa, Symphorien Ongolo

### ► To cite this version:

Richard Sufo Kankeu, Moise Tsayem Demaze, Max Krott, Denis Jean Sonwa, Symphorien Ongolo. Reprint of "Governing knowledge transfer for deforestation monitoring: Insights from REDD+ projects in the Congo Basin region". *Forest Policy and Economics*, 2020, 114, pp.102105 -. 10.1016/j.forpol.2020.102105 . hal-03490925

**HAL Id: hal-03490925**

**<https://hal.science/hal-03490925>**

Submitted on 22 Aug 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License



ELSEVIER

Contents lists available at ScienceDirect

## Forest Policy and Economics

journal homepage: [www.elsevier.com/locate/forpol](http://www.elsevier.com/locate/forpol)

# Governing knowledge transfer for deforestation monitoring: Insights from REDD+ projects in the Congo Basin region

Richard Sufo Kankeu<sup>a,b,\*</sup>, Moise Tsayem Demaze<sup>a</sup>, Max Krott<sup>c</sup>, Denis Jean Sonwa<sup>b</sup>, Symphorien Ongolo<sup>c</sup><sup>a</sup> Le Mans Université, Geography Department, ESO Laboratory, Le Mans, France<sup>b</sup> Centre for international forestry research (CIFOR), Yaoundé, Cameroon<sup>c</sup> University of Göttingen, Chair of Forest and Nature Conservation Policy, Göttingen, Germany

## ARTICLE INFO

## Keywords:

Forest policy

RIU model

Knowledge transfer

REDD+

Monitoring verification and reporting (MRV)

## ABSTRACT

Since the end of 2000s, many forest-rich countries have engaged into results-based deforestation reduction monitoring under REDD+ mechanisms. A set of methods and tools designed at international level is expected to be transferred to the domestic level in many developing countries, in order to generate information on how these countries contribute to global emissions reduction through local forest landscapes. Using the monitoring, reporting and verification (MRV) device as an example, this paper sets out to analyze this knowledge transfer by identifying bottlenecks. It proposes an original analysis that will help to better understand how such knowledge transfers could be improved at the domestic level. Based on empirical case studies related to REDD+ projects in Cameroon, the Democratic Republic of Congo and Rwanda, it assesses knowledge transfer and the role of stakeholders involved at multiple levels (global, regional, national and local). For this purpose, we used the Research Integration and Utilization (RIU) model, which is an analytical framework allowing analyses showing how scientific results can be owned, integrated and disseminated to meet specific needs. Results show that there is a weakness in MRV knowledge transfer from global to local levels and back. The MRV knowledge has a strong research background, a weak MRV knowledge integration and a mitigated direct utilization. The RIU model allows us to identify significant weaknesses in the transfer of MRV knowledge, including institutional dysfunction, weak institutional coordination, a lack of integration and reduced utilization of the scientific knowledge produced, despite the creation of coordinating institutions. These weaknesses are due partly to the absence of a common platform between exogenous and endogenous knowledge. To overcome these obstacles, synergies between scientists and indigenous actors should be explored and developed.

## 1. Introduction

Through the Reducing Emissions from Deforestation and forest Degradation (REDD+) program, the United Nations Framework Convention on Climate Change (UNFCCC) aims to address the issue of climate change mitigation due to forest loss (Change, 2010). The majority of developing countries engaged in REDD+ Program depend on financial and technical assistance from developed countries (Cerbu et al., 2011). Monitoring, Reporting and Verification (MRV) is a set of methods for monitoring REDD+ activities and outcomes. MRV activities include measuring carbon stocks and emissions of carbon dioxide and other greenhouse gases, reporting these measurements to different levels (global/national/local), and verifying that the predictive reductions are effective (Palmer Fry, 2011; Jagger et al., 2014). It is also a

priority to ensure that REDD+ is implemented with environmental and social safeguards, co-benefits and strengthened governance. MRV activities can be carried out at different levels, with local ground truth information being one of the main elements of the process. Building a data system for the national context implies bringing together real information using different local on-the-ground examples. This can help provide an accurate picture of the real carbon stock situation, as well as past emissions, and guide future trends of local deforestation and carbon stock dynamics.

The 'M' of MRV, which refers to forest monitoring or measurement, is a challenge for forest-rich countries. For some researchers, the measurement is part of the monitoring (Palmer Fry, 2011; Larrazábal et al., 2012). It is the first step. Measuring provides data on deforestation, which allows stakeholders to follow the evolution of this

\* Corresponding author at: Le Mans université, Geographiy departement, ESO laboratory, Avenue Olivier Messiaen, 72085 Le Mans Cedex 9  
E-mail addresses: [sufo79@hotmail.com](mailto:sufo79@hotmail.com), [richard.sufo\\_kankeu@univ-lemans.fr](mailto:richard.sufo_kankeu@univ-lemans.fr) (R. Sufo Kankeu).

<https://doi.org/10.1016/j.forpol.2019.102081>

Received 22 March 2018; Received in revised form 6 October 2019; Accepted 9 December 2019

1389-9341/ © 2019 Elsevier B.V. All rights reserved.

deforestation (monitoring). MRV needs practical tools that will help countries be autonomous in their monitoring. However, many barriers remain to MRV effectiveness because technological development is still at an early stage (Sufo Kankeu et al., 2016; Sufo Kankeu et al., 2019; Romijn et al., 2012; Boissière et al., 2017).

The Congo Basin countries has been highlighted as a region with insufficient monitoring capacities for REDD+ purposes (Romijn et al., 2012; Romijn et al., 2015). Most of these countries have produced technical reports, but most usually with external funding and technical assistance from Western experts. To meet the requirements, recipient countries engaged in the REDD+ process must have a thorough knowledge of their forest carbon stocks and the ability to monitor these carbon stocks in space and time at the national level (Gupta et al., 2012). Methods, skills and funding needed for such carbon measurements have been provided by Western aid donor agencies if targeted forests and recipient actors were located in 'weak' or 'fragile' tropical countries (Karsenty and Ongolo, 2012). Consequently, these tropical countries have been in a recurrent need of technical knowledge and financial means to perform the process, particularly in the areas of the forest monitoring, biomass and carbon stock evaluation, forest mapping and reporting systems required to claim a payment (Romijn et al., 2012; Romijn et al., 2015). To complement the national/local expertise that exist in central African countries, external knowledge has been brought in through projects and programs in the form of external scientists and experts from universities and other private, bilateral and multi-national actor.

Apart from discussions during ad-hoc UNFCCC scientific working groups lead by western scientists, such as the SBSTA,<sup>1</sup> there are few formal platforms set up to communicate scientific knowledge at the local level (Tchatchou et al., 2015; Brown and Sonwa, 2015). To fill this gap, informal framework have emerged, based on the interest of stakeholders engaged in the REDD+ process. In order for such Mechanism to succeed, several questions need to be addressed: What are the obstacles or bottlenecks that exist in transferring knowledge from the international to the national and local levels? Are there any constraints on top-down knowledge transfer? In the context of Central Africa countries, do stakeholders have enough of an institutional framework to acquire MRV knowledge? In this paper we aim to use these subsidiary questions to examine three empirical case studies from Cameroon, the DRC and Rwanda. We set out to analyze MRV knowledge production and transfer, to identify obstacles and propose a key scheme for concrete transformational change of MRV knowledge transfer. This paper focuses not only on knowledge transfer but also on the stakeholders, their attitudes to MRV knowledge and their interactions. These three cases studies (Cameroon, the DRC and Rwanda) are analysed employing RIU framework, a recent and highly innovative analytical framework: the Research-Integration-Utilization (RIU) model (Böcher and Krott, 2016b). These three key elements will be used to analysed our case studies.

Following this introduction, Section 2 is dedicated to the conceptual and theoretical framework. This is followed by methods and data collection in Section 3. Our findings and analyses are presented in Section 4, and discussion and implications in Section 5, while Section 6 provides some concluding remarks.

## 2. Conceptual and theoretical framework

### 2.1. On the exogenous, local and scientific features of knowledge

Endogenous knowledge, also known as 'local knowledge' (LK), is contrasted in this paper with exogenous knowledge, otherwise known

as 'scientific knowledge'. Local knowledge covers the indigenous, traditional, innate knowledge that is associated with local rural people's way of life. Many definitions of LK co-exist in literature (Heyd, 1995; Mawere, 2010; Sonwa et al., 2009; Warburton and Martin, 1999). However, the definition proposed by Warren (1991) is particularly interesting in terms of this research. According to Warren (1991:1), local knowledge refers to "a knowledge that is unique to a given culture and society which is passed down from generation to generation and is the basis of local level decision making concerning agriculture, health, natural resources management". According to this definition, the specificity of LK is that it is a knowledge that has been historically used to ensure the livelihoods and survival of indigenous and local populations including forest-dependent people. Exogenous knowledge (EK), in contrast, is produced through scientific methods that have been codified, tested and archived in order to be replicated and improved. Exogenous refers to scientific knowledge produced by scientists and research institutions based on rigorous validated methods (Warren, 1991; Agrawal, 1998). It also refers to secondary synthesized knowledge on MRV produced by policy makers and development institutions through the compilation of scientific knowledge. EK is often assimilated to Western knowledge as it is formally rational-based, more or less available to everyone, rigorously tested, and broadly accepted as reliable.

Governance of knowledge transfer in this paper concerns how the deployment of co-management processes influences knowledge production and transfer (Foss, 2007; Foss and Michailova, 2009). The governance of knowledge transfer implies a clear identification of key actors and their roles in the process of production, management and dissemination of knowledge within a specific mechanism such as MRV in the framework of REDD+ implementation (Fig. 1). The governance of knowledge transfer then is a formal process in which institutions are designated to manage the knowledge, process or mechanism of transfer (platform, place, and means). Ultimately, good governance of MRV knowledge results in the organization of transferring exogenous knowledge to local or national actors so they can measure or monitor deforestation in developing countries.

### 2.2. Analyzing MRV knowledge transfer through RIU model

This paper employs the Research-Integration-Utilization (RIU) model (see Fig. 1) developed by Böcher and Krott (2016b) which is particularly appropriate for forest and environmental studies. The model was developed for types of scientific knowledge transfer that differ from classic knowledge transfer, which follows typical linear, functional and co-productive models (Böcher and Krott, 2014; Böcher and Krott, 2016b; Böcher and Krott, 2016a). In the context of REDD+, the notion of 'Research' within this model refers to scientific knowledge related to MRV. 'Integration' plays the role of interface between the scientific spheres and society; whereas 'Utilization' refers to the end-user, who is either in political or practical technical spheres.

RIU model has been applied to analyze multilevel issues of scientific knowledge transfer in environmental and forestry domains, especially in European (Heim and Böcher, 2016) and Asian countries (Dharmawan et al., 2016; Do Thi et al., 2017a; Nagasaka et al., 2016b). From a methodological perspective, the originality of the present paper is to test the governance of knowledge under a specific environmental technical tool called MRV.

The conceptual framework (Fig. 1) summarizes the directions taken to clarify our research question. We are interested in the governance of knowledge transfer, focusing on the actors and their means (1). This leads us to highlight the transfer of exogenous and endogenous knowledge essential for the elaboration of MRV devices (2). Data collected and described are finally analyzed with respect to the RIU model (3).

MRV knowledge transfer represents a complex framework of global knowledge transfer, from the scientific arena to the local-level end user,

<sup>1</sup> The Subsidiary Body for Scientific and Technological Advice (SBSTA) is one of two bodies permanently established by the Conference of Parties (CoP) to help provide up-to-date scientific and technological advice to the CoP.

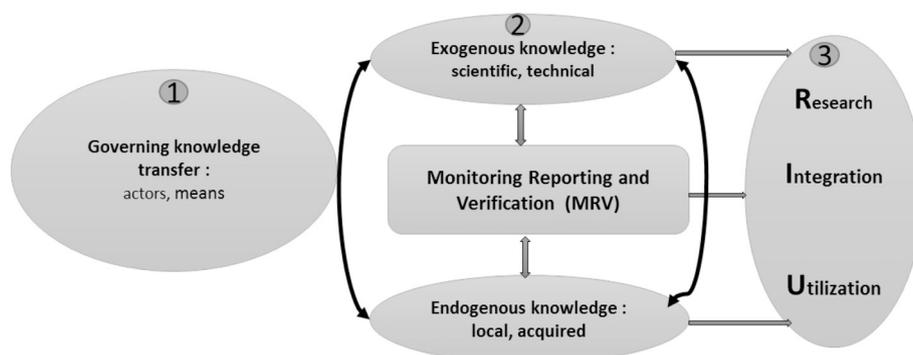


Fig. 1. Conceptual framework of a knowledge transfer system (adapted from the RIU model).

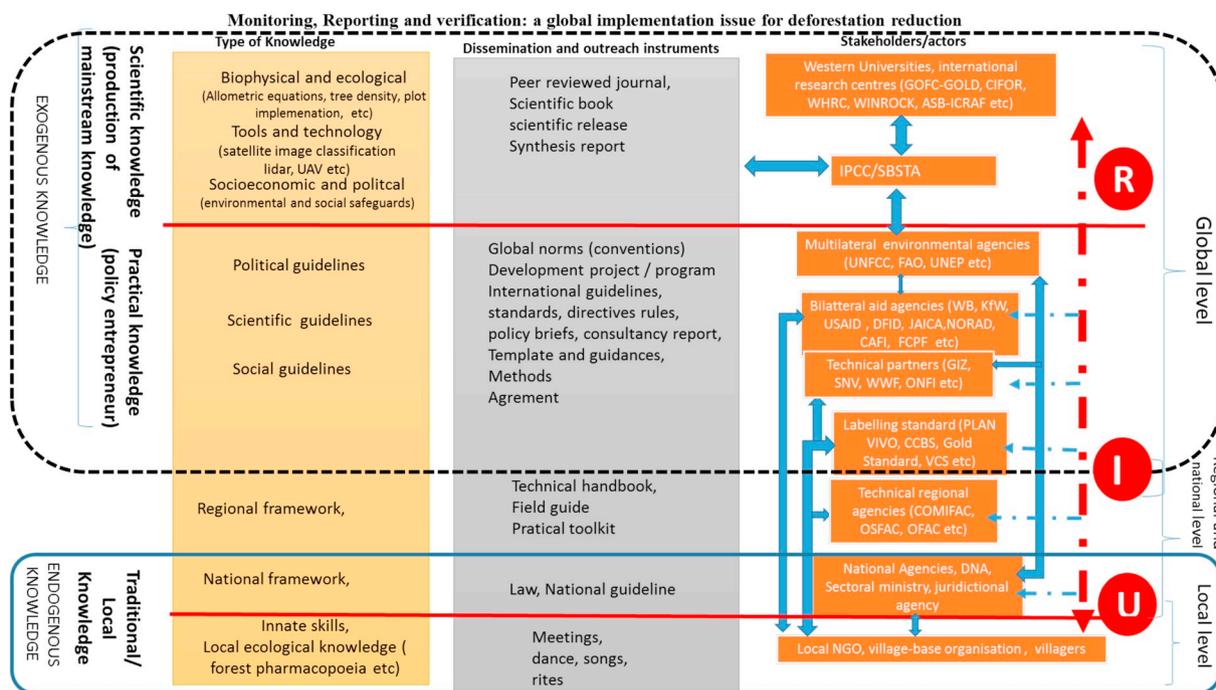


Fig. 2. Framework design of scientific knowledge and actors according to the RIU model.

passing through the political and institutional arena. The framework in which we intend to consider knowledge transfer consists of a cross-cutting edge in which there are three variables: i) the typology of the knowledge produced, outreach instrument and stakeholders; ii) the knowledge domain with the exogenous and endogenous knowledge; iii) multiple scales covering global, regional, national and local levels. As shown in Fig. 2, the scientific knowledge can be divided into three sectors for the purpose of MRV: biophysical and ecological; tools and methods; and socioeconomic and political. The knowledge is disseminated through scientific papers in peer-reviewed journals. As these journals mostly target a scientific readership, the information they convey can easily be overlooked by political and practical stakeholders. Three main elements are considered: stakeholders, dissemination instruments, and type of knowledge (Fig. 2).

Endogenous knowledge produced at the local level, or learned through experience during contacts with external development partners is also relevant to MRV. Presence of environmental, social and development partners, whether through bilateral or multilateral partnerships, can make a difference at the local level during MRV activities. Depending on local contacts, relationship between the local people and the forest, and presence of development organizations, skills developed by local communities can help with the monitoring of both forest and the environment. As such, the constructed and innate knowledge that

can serve the MRV encounters scientific knowledge. These different knowledges will then need to mix to create new strong and effective knowledge. The knowledge conjunction created by the meeting and friction between different knowledge types has received little attention from scholars. The three case studies detailed below, based on pilot projects in Cameroon, the DRC and Rwanda, will constitute our empirical research cases.

### 3. Methods: data collection and case study contexts

#### 3.1. Data collection

The collection of scientific data on MRV was initially conducted through intensive desk-based research. Materials were found in peer-reviewed journals, scientific books or releases and other scientific documents. Another set of materials was found in guidelines, reference works, and practical toolkits developed by multilateral or bilateral funding agencies or labelling standard experts. The basic Boolean operators 'AND, OR, NOT or AND NOT' were used to include and exclude documents not in line with the overall theme of this paper. The selection was made based on any knowledge or data that referred to REDD + MRV or that could help build the MRV process. This literature search was based on key word research using mainly Google Scholar and

occasionally Google. We based our method on interviews with key informants at international, national and local levels. Information was collected during meetings involving one, two or many of the following actor categories: REDD+ experts, scientists, policy entrepreneurs, donors and technical partners. Data collection on the case studies was completed in person by the first author of this paper from May to August 2014 across the three field sites; a couple of update processes were made after this period of field work.

Additionally, based also on our experience in these study areas, we formulated hypotheses and analyzed results from the field. The substantial experience of the first author as a ‘scientific expert’ with institutions; at both local and international levels, was useful for identifying the correct roles of many of the organizations involved in REDD+ processes and their influence on the production and dissemination of knowledge within climate management. We used RIU model to characterize stakeholders and their role, to analyze possible barriers to knowledge transfer within the REDD+ mechanism in the Congo Basin.

### 3.2. Case study contexts

Spanning approximately 175 million hectares (De Wasseige and Flynn, 2013), forest in the Congo Basin plays a very important ecological, social and economic role for global biodiversity and climate change mitigation (Mayaux et al., 2013). The three forest landscapes in Cameroon, the DRC and Rwanda (Fig. 3), analyzed in this article are located in distinct political and forest governance contexts that affect MRV knowledge transfer differently, particularly in terms of use or misuse of local knowledge.

During implementation of this research from 2014 (data collection) to 2018 (data analysis), Cameroon was more or less considered to be an emerging country with a relatively stable political system. The country had a medium degree of forest law enforcement. During the same period the DRC, a post-conflict country, had a decentralized state organization system and was impacted by extreme poverty and collapsed forest regulation. Conversely, Rwanda, although also a post-conflict

country, was a strongly centralized and authoritarian state with strong forest law enforcement. At the time of this research, Rwanda was considered to be one of Africa's most prosperous tropical countries.

These three countries have high forest coverage with 30% of Rwanda, 46% of Cameroon and 59% of DRC covered by forest (Megevand et al., 2013; Rwanda, 2013). The three countries have developed relatively advanced institutions and governance frameworks for deforestation monitoring and reporting. Equally, they all embraced the REDD+ mechanism simultaneously, each struggling to prepare the institutional, technical and financial framework required for REDD+ implementation. Cameroon is a specific case, as far as the REDD+ process and national institutions are concerned (Tsayem Demaze et al., 2015). As such, the Cameroon case study is more receptive and aware of technical monitoring than other countries. In contrast, the DRC and Rwanda cases are more complex due to both the administrative organization of these countries and to the sociological level of the local people. As shown in Table 1, the DRC case is inappropriate for effective MRV knowledge transfer due to the formal over decentralization, weak state representation and local illiteracy. The absence of forest, high centralization of the state, and medium levels of literacy among local people in the northwest of Rwanda are some of the difficulties that have defeated efforts in this country.

## 4. Results

### 4.1. Actors and MRV knowledge transfer: From fragmentation to complexity

#### 4.1.1. Mapping a constellation of actors of knowledge governance in the DRC

In the north-west of the DRC, years of civil war and the weakness among local institutions have created socio-political disorder that encourages uncontrolled deforestation. Forest governance has been highly impacted by years of extreme poverty and poor governance. While many actors recognize that efforts have been made at the national level

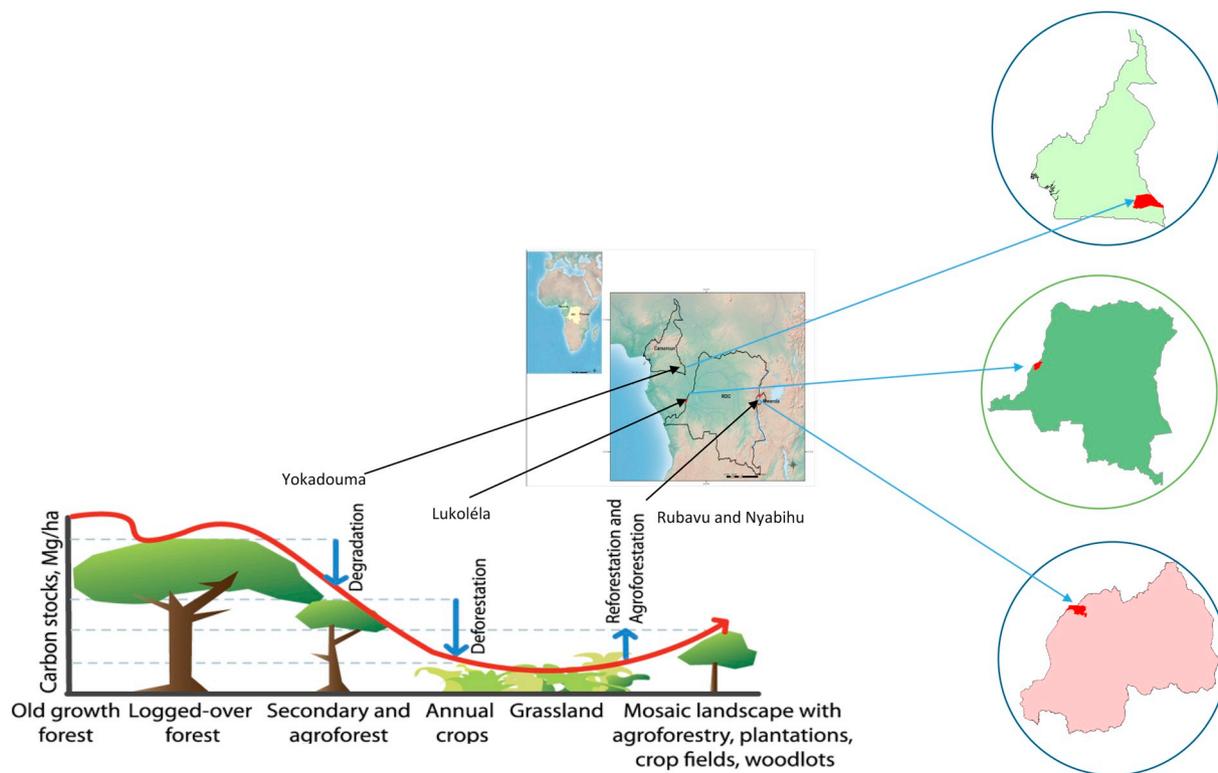


Fig. 3. Location of the three pilot sites in the Congo Basin region.

**Table 1**  
brief description of the forest governance and socioeconomic context of study sites.

Domain	Yokadouma Cameroon (TNS LS)	Lukolela DRC (Lac Télé-Lac Tumba LS)	Nyabihu and Rubavu Rwanda (Virunga LS)
Forest governance and institution	<ul style="list-style-type: none"> <li>● Robust law enforcement and implementation</li> <li>● Strong local institutions</li> <li>● Project in two community forests</li> </ul>	<ul style="list-style-type: none"> <li>● Weak law enforcement</li> <li>● Weak local institutions and failure of government follow-up</li> <li>● Project in remote decentralized district</li> </ul>	<ul style="list-style-type: none"> <li>● Robust law enforcement</li> <li>● Good local institution activities</li> <li>● Project in well-organized communities</li> </ul>
Deforestation and degradation	<ul style="list-style-type: none"> <li>● Degradation due to logging and agriculture activities</li> </ul>	<ul style="list-style-type: none"> <li>● High deforestation due to 'slash and burn' agriculture, and forest logging</li> </ul>	<ul style="list-style-type: none"> <li>● Reforestation and agroforestry (bamboo and eucalyptus plantations)</li> </ul>
Socioeconomic and political context	<ul style="list-style-type: none"> <li>● Stable country but with security issue in the east and north part and also secessionist claims</li> <li>● Strong local experience and traditional knowledge of natural resource management</li> </ul>	<ul style="list-style-type: none"> <li>● Weak state at local level a post-conflict status (rural poverty)</li> <li>● Poor experience on forest monitoring but good local knowledge</li> </ul>	<ul style="list-style-type: none"> <li>● Decentralized next to centralized state in a post social crisis context (risk of conflict from Goma in the DRC)</li> <li>● Poor local experience on forests but good reporting skills</li> </ul>

LS: Landscape, TNS: Sangha Trinational, a landscape that cover protected forest between Central African Republic, Cameroon and Congo-Brazzaville.

to push the REDD+ process forward, independent observers highlight that a large part of the technical work remains to be done. For example, international NGO expert are very skeptical about the progress of the REDD+ process due to the compartmentalization of actors. Following Schusser et al. (2016) works on the notion of 'actor' in comparative research, we broke down the governance structure of REDD+ institutions in the DRC into national and international technical partners, civil society organizations, national institutions, development actors or donors, and research institutions (Table 2).

With regards to institutional organization, the national strategy stipulates that the DRC should have a multisector anchorage. The process was led initially by the National REDD+ Coordination (CN-REDD) attached to the Directorate of Sustainable Development. Subsequently, the National REDD+ Fund (FONAREDD) led the process in the Multi-Partner Trust Fund Office (MPTF) under the leadership of the UNDP. The main role of FONAREDD is to ensure inter-sectoral coordination, resource mobilization, and the monitoring of the fiduciary implementation of projects. This inter-ministerial committee, brings together representatives of national stakeholders, and is responsible for strategic coordination and decisions. Within the DRC's state bureaucracy system, the Ministry of Environment, Nature Conservation and Tourism (MECNT) is liable for forest management. Other ministries involved are the Ministry of Agriculture, Fisheries and Livestock (MINAGRI), the Ministry of Scientific and Technological Research (MINREST), the Ministry of Energy and Water Resources (MERH), the Ministry of Communication and Media, and the Ministry of Higher Education and Universities. Civil society organization are coordinated by the REDD Climate Working Group (GTCR).

Civil society organizations contribute to the governance of knowledge and the REDD+ MRV system in the DRC. The Forest Peoples Programme (FPP), a non-state organization engaged with the CN-REDD and MECNT to implement the Free, Prior and Informed Consent (FPIC) of local people on the agreement in REDD+ in the DRC, is part of these civil society organizations. Donors or development actors were represented by the likes of UNDP, NORAD, AfDB, the World Bank and FAO. Technical and research partners influencing the MRV system in the domestic sphere were mainly represented by the Catholic University of Louvain (UCL) – a Belgium academic institution, International research Institute for Applied Systems Analysis (IIASA), the Japan International Corporation Agency (JICA), the World Resource Institute (WRI), Woods Hole Research Centre (WHRC) and the Center for International Forestry Research (CIFOR). The technical organization, like World Wide Fund for Nature (WWF), Wild Conservation Society (WCS), and African Model Forest Network (AFM), have been involved for years in the technical training of actors (Table 2).

According to REDD+ national strategy and discussions with experts, there is no formal structure for MRV knowledge transfer. In the absence of a state bureaucratic management structure for REDD+ MRV

issues in the DRC, private actors and research institutions have stepped into the void. Little information on MRV were flowed from the National REDD+ leading institution FONAREDD to the district level. At the project level in Lukolela, the forest district officer was the main local actor, but had no real power to influence the REDD+ MRV system. From a socio-political perspective, the local situation is not bright, civil war and political instability have occurred since independence was declared in the early 1960s.

#### 4.1.2. Actors governing MRV knowledge transfer in Cameroon

The southern part of Cameroon is a forested area subject to selective forest exploitation. Forestland tenure in this region is organized into two categories: permanent forest and non-permanent forest. The first category is divided into Forest Management Units (FMU), forest reserves, protected areas, communal forests and hunting zones. Non-permanent forest consists up of community forests and sales standing wood volume. Organization of forestland into these categories has slowed down uncontrolled deforestation particularly in the permanent forest domain (Chia and Sufo Kankeu, 2015).

Until 2017, the overall process of REDD+ was formally supervised by a steering committee under the prime minister; this was handled technically by the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), and supported by a technical secretary of REDD+ for the management of MRV issues. The Ministry of Forests and Wildlife (MINFOF) co-chaired MRV activities with MINEPDED.

Other multi-scale and multi-sector actors were also involved in MRV and knowledge transfer activities, including the focal points of the United Nations Framework Convention on Climate Change (UNFCCC), the National Observatory on Climate Change (ONACC) and the National Coordinator of REDD+ who all played an important role. Alongside the technical ministries, the Ministry of Scientific Research and Innovation (MINRESI), the Ministry of Higher Education (MINESUP), and the Ministry of Territorial Administration and Decentralization (MINATD) were all involved in the production and circulation of knowledge. Civil Society organizations (REFACOF, ROS4C), international conservation NGOs (IUCN, WWF), technical financial partners (GIZ, FAO, US Forest Service, UNDP) and development partners (AfDB, World Bank), all contributed through their partnerships with MINFOF and MINEPDED.

#### 4.1.3. Actors governing MRV knowledge in Rwanda

Rwanda suffered a tragic civil war and genocide that obstructed the development of social and educational structures, particularly from the early 1990s to end of the 2000s. As seen in many sub-Saharan countries including the DRC and Cameroon, a lack of efficient energy sources for cooking has led to massive deforestation of forestlands since the 1990s. However, post-genocide environmental education initiatives and law enforcement measures in the forest domain have led to high

**Table 2**  
Mapping of key institutions involved in MRV knowledge transfer in Cameroon, the DRC and Rwanda.

Government institution	Ministries Technical institution	DRC	Cameroon	Rwanda
		MECNT, MINAGRI, MINREST, MERH, FONAREDD, CN-REDD, GTCR	MINEPDED, MINFOF, MINRESI, MINESUP, MINATD; STREDD + *, ONACC,	MINIRENA, MINALOC MINEDUC, RDB, REMA, RAB, RNRA,
Technical partners		GIZ*, WCS, WWF, RAFM, VCS*, CCBS*, COMIFAC*, WRI, JICA PREREDD*, UNDP*, PACEBco*, IUCN*, VCS*, CCBS*	GIZ, FAO, US forest service UNDP, IUCN*, COMIFAC, PREREDD, WWF*, PACEBco, IUCN, VCS, Plan vivo*	WCS, BTC*, NUFFIC*
Research organization		Universities, IIASA, WHRC, CIFOR*, UCL	IIASA, Universities, CIFOR*, ICRAF*, CIRAD*	COMIFAC, PACEBco, UN-REDD +, IUCN
Donors		UNDP*, FCPF*, NORAD*, AfDB*, World Bank, FAO*, UN-REDD +, CEEAC*	FCPF, NORAD*, AfDB, World Bank, FAO, UNDP, PACEBco, CEEAC	USAID, AfDB, World Bank, UN-REDD +, Australian Aid, PACEBco, CEEAC
Civil society organizations		OIP*, FPP,	REDD + and climate change platform, RFC*, REFACOF*, ROS4C*	ARECO-Rwanda Nziza*

\*AfDB: African Development Bank; ARECO-Rwanda Nziza: Association Rwandaise des Ecologistes; BTC: Belgian Development Agency; CCBS: Climate, Community and Biodiversity Standard; CEEAC: Economic Community of Central African States; CIFOR: Center for International Forestry Research; CIRAD: French Agricultural Research Centre for International Development; COMIFAC: The Central African Forest Commission; ECCAS: The Economic Community of Central African States; FAO: Food and Agriculture Organization; FCPF: Forest Carbon Partnership Facility; GIZ: German International Cooperation Agency; ICRAF: World Agroforestry; JICA: Japan International Corporation Agency; NORAD: Norwegian Agency for Development Cooperation; NUFFIC: Netherlands Organization for the Internationalization of Education; ONACC: National Observatory on Climate Change in Cameroon; PACEBco: The Congo Basin Ecosystems Conservation Support Program; PREREDD: Projet Régional REDD +; REFACOF: African Women's Network for Community Forest Management; RFC: Community Forestry Network; ROS4C: Cameroonian Civil Society Organizations Network on Climate Change; STREDD +: National REDD + Strategy of Cameroon; UNDP: United Nations Development Program; UNREDD: United Nations REDD Program; VCS: Voluntary carbon standard; WRI: World Resource Institute.

reforestation, with the popularization of the 'family forest'.<sup>2</sup> State bodies are strong and well-structured with efficient local representation, including those bodies in charge of the forest, environmental and education sectors: the Ministry of Environment and Natural Resources (MINIRENA), the Ministry of Local Government (MINALOC) and the Ministry of Education (MINEDUC). These state bodies are the main handlers of knowledge, transferring from international institutions to local actors. Among those stakeholders actively engaged in Rwanda's climate change activities, many are involved directly or indirectly in knowledge transfer, including the Ministry of Lands and Forestry, through the Rwanda Water and Forestry Authority (RWFA), and the MINIRENA, through the Rwanda Environment Management Authority (REMA). The Rwanda Development Board (RDB), which manages national park forestland, the Rwanda Agricultural Board (RAB) and the Rwanda Natural Resources Authority (RNRA) coordinated knowledge-transfer activities. The National Industrial Research and Development Agency (NIRDA) stands out as a research institution involved in biodiversity assessment training, closely related with MRV activities.

Local actors include District Forestry and Natural Resources Officer and Forestry Extension Officers. According to the national Forest Investment Plan (FIP), the roles of actors is formally clarified from state to the district level. A number of institutions are involved in decentralized action, from national to local level. This action is supervised by many centralized technical institutions (RDB, REMA, RAB and RNRA) that are strongly legitimated by the state, and offer the advantage of having built up a sustainable scheme. In the Nyabiyu and Rubavu areas of west Rwanda, the situation differs with regards decentralization and actors. At village level, the lowest administrative unit, all actors are involved in reforestation. In villages like Rurengheri, Rukoma, and Kanyove for example, forest plantation has been increasing so fast that each family has their own eucalyptus plot. Outside of local and national NGOs, however, few organizations exist at village level, thus weakening the flow of knowledge.

#### 4.1.4. Institutional issue and knowledge governance

Analysis of the actors involved in knowledge transfer in the three case studies shows different stages of responsibility in MRV knowledge

<sup>2</sup> According to Rwanda's forest law, 'family forest' refers to a private forest owned by one family; this is present in almost all family plots.

governance (Table 2). Of all categories, technical institutions are the most involved.

MRV knowledge transfer in the Congo Basin region is often handled by foreign actors recruited by development organizations, technical and financial partners and research organizations. National partners often act as support entities for MRV initiatives coming from abroad, while local actors are usually those most aware of any knowledge transfer issues due to the related effects on their livelihoods. We observed that local-level forest monitoring knowledge were more useful for a domestic implementation of REDD+ MRV activities than imported expertise. For this reason, research organizations and international actors occasionally work directly with local-level actors circumventing national actors and institutions. Projects from abroad come with significant technical knowledge to be absorbed. Relationships between researchers and local communities are frequent due to the need to validate research results or implement development or research projects. These relationship strengthen the capacities of those rural people who will be involved in projects thus building an important pool of local experts.

#### 4.2. Scrutinizing MRV knowledge transfer through the RIU model

Both the production and dissemination of MRV knowledge remain complex in the Congo Basin due to fragmentation of the multiple actors interacting through erratic formal platforms. The model aids in identifying and analyzing bottlenecks that can slow the process within a REDD+ context in Congo Basin context (Table 3).

As presented in the table, the MRV knowledge has a strong research background, a weak MRV knowledge integration and a mitigated direct utilization

##### 4.2.1. MRV knowledge: strong research focus for poor dissemination

The in-depth analysis behind Table 3 has shown that the scientific knowledge produced by scientists, accessed through peer-reviewed papers and scientific releases, is not always useful for actors in the Congo Basin, as utilization of this scientific knowledge is often not possible for REDD+ actors who are not from academic spheres, due to the limited accessibility and publication language (English) of peer-reviewed papers, particularly when the majority of Congo Basin countries are French speaking. There is a need to select and customize scientific knowledge to be adapted to those actors who are not from

**Table 3**  
An assessment of MRV knowledge transfer in the Congo Basin based on the RIU model.

RIU Model activities	Criteria	Fulfillment of criteria <sup>a</sup>	Description of MRV activities
Research	Assess current scientific information	++	MRV is one of the most important aspects to be assessed through the REDD+ process Methods provided in the research are accurate, practice and credible
	Complies with procedures of sound practice	++	
	Cooperates with scientific project and institution	++	Much of the research is based on scientific projects and research institutions
	Provides independent meaningfulness of scientific findings	++	Finding have been provided based on allometric equation, plot implementation, remote sensing and carbon stock modeling. However databases do not meet high scientific standards
Integration	Oriented toward public goals and demand	+	The main goal is evaluation of GHG and forest carbon stock.
	Relevant to political processes	++	All data produced on MRV are in reaction to challenges in the field All allies (stakeholders) should be able to access the results of research, regardless of whether support is provided or not
	Relevant to internal, external, 'wise' and learning allies	+	
	Target group oriented information provided in the right medium	--	Scientific results in scientific journals and books are not accessible to all;
Utilization	Participates in scientific discourse	++	Contributes to scientific discussion; discussions around MRV issues have been very productive over the last decade.
	Contributes to democracy	--	Politics has not really changed with REDD+ implementation (if some aspects of governance have improved, there is no clear link between these improvements and the REDD+ process).
	Contributes to rule of law	+	New legal institutions, texts and decrees have been created from the MRV implementation process (e.g. national institutions, like STREDD+ and ONACC in Cameroon, and FONAREDD in the DRC, have been created to lead the MRV process).
	Contributes to good governance	+	The REDD+ scheme has largely contributed to the good governance of natural resources and changed the behaviors of civil servant
	Provides appropriate solutions to problems	++	MRV scientific publications provide solutions to policy and local MRV issues, but need to be accessible

<sup>a</sup> Score: fulfillment of the criteria from strong to weak: ++, +, -, --;

academic spheres. Following the principles of the RIU model, press releases, toolboxes, guidelines, policy briefs and technical handbooks could all be used as the main dissemination tools for efficient MRV knowledge transfer in the Congo Basin. Likewise, international scientific organizations like IPCC, SBSTA, IUFRO, CIFOR, FAO and GOF-C-GOLD, GFOI,<sup>3</sup> which have been identified as the main producers of MRV knowledge, should adopt specific measures for appropriate dissemination of scientific knowledge to the general public.

#### 4.2.2. Weak MRV knowledge integration

The huge amount of data on MRV produced since the launch of REDD+ at the end of the 2000s contrasts with the lack of 'accessible' scientific knowledge available for policy makers and local actors. Likewise, not all stakeholders – 'allies' in RIU model terminology – are always involved in the production of MRV knowledge, nor in the integration process of its transfer. In the case of Cameroon, for example, the central organization in the REDD+ process, STREDD+, struggled to transform technical and scientific documents into accessible formats for local and forest-dependent people. Ultimately, little has been done to facilitate effective ownership of MRV knowledge through the REDD+ process in the Congo Basin. In the project site of Yokadouma in Cameroon, it was challenging to find anyone who was informed about the issue of climate change, let alone the REDD+ process.

#### 4.2.3. Mitigated direct utilization

Low integration of knowledge alters the utilization of knowledge. Usually, the targets of scientific knowledge are academic and research actors, rarely policy makers and local population. In other words, results and explicit or implicit recommendations in scientific papers do not reach the appropriate audience who can change society, particularly in the context of social and political uncertainties, as seen in Congo Basin countries. In this region, policy actors in state bodies are

still requesting knowledge and technology transfer within REDD+ arenas to curb domestic forestland conversion. Creation of national institutions to handle the REDD+ process, as seen in Cameroon and the DRC, give hope for the effective transfer and utilization of MRV knowledge. In Cameroon and the DRC, the launch of national-level REDD+ strategy documents indicates that improving the circulation of MRV knowledge would be a good starting point toward ownership of the REDD+ process in the countries.

#### 4.3. Barriers around MRV knowledge transfer in the Congo Basin

Looking at the principles of the RIU model, strong internal integrators of knowledge are still lacking for rigorous monitoring of deforestation and forest degradation in the DRC, Cameroon and Rwanda. The case of Maï Ndombé in the DRC is an interesting example. Maï Ndombé has been a project with many interventions and funding flows for a range of REDD+ activities, including for MRV knowledge production and transfer. While such interventions and financial resources have led to the improvement of MRV tools and methods, there are still bottlenecks relating to the management and coordination of this project.

Country profiles also influence the transfer of MRV knowledge from the national to local level. As an example, the political and social context of the DRC is less favorable for efficient MRV knowledge production and transfer than Cameroon or Rwanda. Civil war, a rocky decentralization process and extreme poverty have tended to reduce the capacity of state bodies in the DRC, in terms of the co-production and ownership of scientific knowledge needed for robust implementation of REDD+ in the country. There is continuous external technical assistance, without which key sectoral ministries involved in REDD+ would have not been able to produce and use MRV knowledge. In contrast, due to the political stability and relative institutional strength in Cameroon and Rwanda, these two countries seemed to be almost ready to carry out REDD+ processes at a domestic level.

Among the three countries analyzed in this paper, the DRC is a prime example of advanced decentralization. From district to provincial

<sup>3</sup> GFOI: Global Forest Observations Initiative; GOF-C-GOLD: Global Observation for Forest Cover and Land Dynamics.

and national level, decentralization has become a barrier for knowledge transfer. Poverty is exacerbated by decentralization, demonstrated by the fact that rural people are very far from central command. In a country as large as the DRC, it is fairly difficult to ensure knowledge transfer from the national to the provincial level in the absence of an institutional framework for that purpose. Forest management has therefore been impacted by this socioeconomic and political instability. The Cameroonian and Rwandan cases are very similar in so far as governance and decentralization is concerned, although the Rwandan decentralization is stricter than that of Cameroon. The Rwandan Governance Board (RGB) has been engaged in decentralization since the early 2000s without significant change; this has involved vertical decentralization, where the central government remains the principal element and local people are agents. This political will for decentralization has helped to transfer forest management responsibilities to local people, and this transfer has been transformed into knowledge.

## 5. Discussion

In this paper, we have outlined the governance of MRV knowledge and examined the distinction between exogenous and endogenous knowledge in the Congo Basin context. MRV knowledge governance in the three case studies (the DRC, Rwanda and Cameroon) is influenced by the different contexts of these countries. We have shown that these three countries have significant differences in terms of their political dynamics and forest governance; this predisposes them to a management system for the transfer of specific scientific knowledge. Actors involved in knowledge transfer do not follow any formal frameworks, instead adapting their practices depending on the specific country context, including political contexts at the domestic level.

### 5.1. Exogenous knowledge vs endogenous knowledge?

Traditional/endogenous knowledge and management practices have recently been embraced, particularly in relation to helping local communities and forest-dependent people to adapt to climate change; this has included adjusting agricultural calendars, improving crop selection, and management of forest and woodland species. This is in stark contrast with how endogenous knowledge has been neglected and ignored since colonization in former Western colonies like those in the Congo Basin region, where indigenous people were not supposed to produce useful knowledge (Coquery-Vidrovitch 2017). With the emergence of REDD+, it is well known that local populations can substantially contribute to the measuring and monitoring of forest biomass and carbon stocks, if the key scientific elements required are transferred to them (Danielsen et al., 2013).

### 5.2. The RIU model

This paper demonstrates how the RIU model can be applied to MRV knowledge transfer analysis. The focus on MRV knowledge transfer in this article was motivated by the importance of the issue within the REDD+ process in forest-rich countries like those in the Congo Basin. Scholars have mainly been interested in knowledge transfer in REDD+ as a whole (Tchatchou et al., 2015; Oreskes, 2004; Houghton et al., 2001) rather than specifically knowledge transfer of MRV systems. Several previous studies employing the RIU model have shown successful implementation of scientific knowledge transfer at global, national and project-based levels (Do Thi et al., 2017a; Do Thi et al., 2017b; Nagasaka et al., 2016a; Böcher and Krott, 2014). Conservation practitioners and local forest management committees were actively engaged in implementing policy, as this is in accordance with their respective interests. Actors then acted in their own interest, influencing local or national stakeholders on how to use natural resources. Actors can selectively adopt specific environmental idioms that can serve their own interests. Evidence provided by Pasgaard (2015) is in line with our

present finding on the knowledge transfer and interest of actors.

In contrast to these previous studies, the present paper has shown a complex pattern of MRV knowledge transfer that cannot be understood through the RIU model alone, but that requires the integration of transversal ‘policy entrepreneurs’ who play the role of integrator at all levels of exchange. There is, then, a kind of “politicization of science” and “scientization of politics”, already shown by Maasen and Weingart (2005) who confirmed the power relationships of actors at the international level. There is a need not only for “wise allies”, as stated Böcher and Krott (2014), but also an integrator, named by Pielke and A (2007) as an “honest broker”. The assessment of knowledge transfer through the lens of the RIU model shows compliance with the research aspects of MRV; there is regard for research procedures, but also high availability of scientific data related to the concept of MRV. However, there is a low level of stakeholder integration in each country’s knowledge transfer platform, even where there is strong political will.

### 5.3. Governance of MRV knowledge transfer in Congo Basin

The diversity and differences among actors still pose significant problems for knowledge transfer, due to conflicts and coordination difficulties, which have been reported at every stage. Regarding conflicts of interest, the categorization of actors has shown that those engaged in MRV knowledge production and dissemination have different interests. Political actors who use knowledge only to serve their own interests have different orientations. As noted by Alemagi et al. (2014), Minang et al. (2014), stakeholder coordination and collaboration remain the core barriers. This observation is in line with what has been demonstrated in this paper. At present, decisions are not yet followed by funding and concrete actions, and MRV schemes remain nascent, lacking true connection between different scales. Decentralization seems to be a good solution for knowledge transfer in states where efforts are made to unite actors with the same objective. MRV knowledge transfer goes beyond the separate interests, as it includes political, donor, scientific and practical strategies. At this stage, we propose that collaboration between scientific and local actors is encouraged and intensified, both to enhance the integration and co-production of knowledge, and also to foster its utilization. It is difficult to highlight commonalities between the diverse categories of actors working in climate and the environment, mainly due to the countries’ different governance systems, and the place that environment and climate issues occupy in the countries’ official agendas. The classification of these actors in this paper is similar to Alemagi et al. (2014) but different to that seen in Schusser et al. (2016) and Somorin et al. (2014). The lack of coordination between actors at all levels shows poor integration and a failure of MRV knowledge transfer. A low level of scientific knowledge utilization has been observed in the studied countries, due to weak stakeholder capacities but also due to a lack of financial and intellectual resources. As a result, there is little integration and use of MRV-related knowledge in the three case study countries.

## 6. Conclusion

In this paper, we set out to analyze MRV knowledge transfer; identify main stakeholders and analyze obstacles for concrete transformational change regarding knowledge transfer. The conventional knowledge channel, from international high-level panel to local-level community, can be broken down into three steps in the context of REDD+. The production of knowledge is completed by scientists with scientific methods to assess a problem and propose solutions. Stakeholders need to adopt the innovation and apply the solution or technique to solve their MRV problem. This shows that MRV knowledge transfer fits with the RIU model, but with some limitations. The first limitation is that the RIU model is inadequate for covering the whole field of MRV. The second is that stakeholders were collaborative at the international level of knowledge transfer, acting in their own interests, while at the

local level, knowledge transfer between scientists and local people is a real opportunity to synergize the knowledge of these parties and emerge with more practical co-produced knowledge. Integration and utilization are the weak spots of knowledge transfer as there has been very little integration and marginal use of MRV-related scientific knowledge at the local level. A formal process, in which MRV knowledge is transferred and followed up on, is also lacking. The Cameroonian case study is the most efficient in terms of MRV knowledge transfer, and the most willing to enhance MRV knowledge transfer, in contrast to the DRC, where highly decentralized districts do not have capacity to be involved. As a whole, this study has shown that interactions between actors are more complicated than anticipated. While the three case studies examined here are dissimilar in terms of bottlenecks, they all face technical issues in terms of MRV implementation. As for removing these barriers, we propose an inclusive synergistic approach, in which all stakeholders can reverse the present trend and contribute to successful MRV implementation. This would involve a formal multi-scale platform being established for interested and involved stakeholders, as well as the integration of co-produced knowledge.

### Declaration of Competing Interest

None.

### Acknowledgements

The authors would like to acknowledge the insightful comments of anonymous colleagues on earlier drafts of this manuscript. Data were collected via the Congo Basin Forest and Climate Change Adaptation and Mitigation (COBAM) project, within the PACEBco programs, funded by the African Development Bank (AfDB) and Economic Commission of Central African States (ECCAS). The funding partners that have supported this research include the Norwegian Agency for Development Cooperation (Norad), the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the CGIAR Research Program on Forests, Trees and Agroforestry (CRP-FTA), with financial support from CGIAR Fund donors. The views expressed here are those of the authors and do not necessarily reflect the views or policies of any organization referred to in this paper.

### References

- Agrawal, A., 1998. Indigenous and scientific knowledge: some critical comments. *Antropol. Indones.* 55 28 P.
- Alemagi, D., Minang, P.A., Feudjio, M., Duguma, L., 2014. REDD+ readiness process in Cameroon: an analysis of multi-stakeholder perspectives. *Clim. Pol.* 14, 709–733.
- Böcher, M., Krott, M., 2014. The RIU model as an analytical framework for scientific knowledge transfer: the case of the “decision support system forest and climate change”. *Biodivers. Conserv.* 23, 3641–3656.
- Böcher, M., Krott, M., 2016a. Science Makes the World Go Round: Successful Scientific Knowledge Transfer for the Environment. Springer.
- Böcher, M., Krott, M., 2016b. Theoretical Foundations of RIU. Science Makes the World Go Round: Successful Scientific Knowledge Transfer for the Environment. Springer International Publishing, Cham.
- Boissière, M., Herold, M., Atmadja, S., Sheil, D., 2017. The feasibility of local participation in measuring, reporting and verification (PMRV) for REDD+. *PLoS One* 12, e0176897.
- Brown, H.C.P., Sonwa, D.J., 2015. Rural local institutions and climate change adaptation in forest communities in Cameroon. *Ecol. Soc.* 20.
- Cerbu, G.A., Swallow, B.M., Thompson, D.Y., 2011. Locating REDD: A global survey and analysis of REDD readiness and demonstration activities. *Environ. Sci. Pol.* 14, 168–180.
- Change, U. U. N. F. C. O. C., 2010. Report of the conference of the parties on its fifteenth session. In: UNFCCC.
- Chia, E.L., Sufo Kankeu, R., 2015. A situational analysis of Cameroon's Technical Operation Units (TOUs) in the context of the landscape approach: critical issues and perspectives. *Environ. Dev. Sustain.* 1–14.
- Coquery-Vidrovitch, C., 2017. Le Congo au temps des grandes compagnies concessionnaires 1898–1930 (Vol. 37). Walter de Gruyter GmbH & Co KG.
- Danielsen, F., Adrian, T., Brofeldt, S., 2013. Community monitoring for REDD+ : international promises and field realities. *Ecol. Soc.* 18.
- De Wasseige, C., Flynn, J., 2013. LOUPE. D. & HIOL HIOL, F. Les forêts du bassin du Congo-Etat des forêts.
- Dharmawan, B., Böcher, M., Krott, M., 2016. The failure of the mangrove conservation plan in Indonesia: weak research and an ignorance of grassroots politics. *Ocean Coast. Manag.* 130, 250–259.
- Do Thi, H., Krott, M., Böcher, M., 2017a. The success of scientific support for biodiversity conservation policy: the case of Ngoc son Ngo Luong nature reserve in Vietnam. *J. Nat. Conserv.* 38, 3–10.
- Do Thi, H., Krott, M., Böcher, M., Juerges, N., 2017b. Toward successful implementation of conservation research: A case study from Vietnam. *Ambio* 1–14.
- Foss, N.J., 2007. The emerging knowledge governance approach: challenges and characteristics. 14. Oxford University Press, Oxford, pp. 29–52.
- Foss, N.J., Michailova, S., 2009. Knowledge Governance: Processes and Perspectives. Oxford University Press.
- Gupta, A., Löfbrand, E., Turnhout, E., Vijge, M.J., 2012. In pursuit of carbon accountability: the politics of REDD+ measuring, reporting and verification systems. *Curr. Opin. Environ. Sustain.* 4, 726–731.
- Heim, J., Böcher, M., 2016. CITES and science: using the RIU model to analyze institutionalized scientific policy advice in Germany for the case of ivory trade. *J. Int. Wildlife Law Policy* 19, 159–175.
- Heyd, T., 1995. Indigenous knowledge, emancipation and alienation. *Knowl. Policy* 8, 63–73.
- Houghton, J.T., Ding, Y., Griggs, D.J., Noguer, M., van der Linden, P.J., Dai, X., Maskell, K., Johnson, C.A., 2001. Climate Change 2001: The Scientific Basis. The Press Syndicate of the University of Cambridge.
- Jagger, P., Brockhaus, M., Duchelle, A., Gebara, M., Lawlor, K., Resosudarmo, I., Sunderlin, W., 2014. Multi-level policy dialogues, processes, and actions: challenges and opportunities for national REDD+ safeguards measurement, reporting, and verification (MRV). *Forests* 5, 2136.
- Karsenty, A., Ongolo, S., 2012. Can “fragile states” decide to reduce their deforestation? The inappropriate use of the theory of incentives with respect to the REDD mechanism. *Forest Policy Econ.* 18, 38–45.
- Larrazábal, A., McCall, M.K., Mwampamba, T.H., Skutsch, M., 2012. The role of community carbon monitoring for REDD+ : A review of experiences. *Curr. Opin. Environ. Sustain.* 4, 707–716.
- Maasen, S., Weingart, P., 2005. What's new in scientific advice to politics? In: Democratization of expertise? Springer, Dordrecht, pp. 1–19.
- Mawere, M., 2010. Indigenous knowledge Systems (IKSs) potential for establishing a moral, virtuous society: lessons from selected IKSs in Zimbabwe and Mozambique. *J. Sustain. Develop. Africa* 12, 209–221.
- Mayaux, P., Pekel, J.-F., Desclée, B., Donnay, F., Lupi, A., Achard, F., Clerici, M., Bodart, C., Brink, A., Nasi, R., 2013. State and evolution of the African rainforests between 1990 and 2010. *Philos. Trans. Royal Soc. B: Biol. Sci.* 368, 20120300.
- Megevand, C., Sanders, K., Doetinchem, N., 2013. Dynamiques de déforestation dans le bassin du Congo.
- Minang, P.A., Van Noordwijk, M., Duguma, L.A., Alemagi, D., Do, T.H., Bernard, F., Agung, P., Robiglio, V., Catacutan, D., Suyanto, S., Armas, A., Silva Aguad, C., Feudjio, M., Galudra, G., Maryani, R., White, D., Widayati, A., Kahurani, E., Namirembe, S., Leimona, B., 2014. REDD+ readiness progress across countries: time for reconsideration. *Clim. Pol.* 14, 685–708.
- Nagasaka, K., Böcher, M., Krott, M., 2016a. Science-policy interaction: the case of the forest and forestry revitalisation plan in Japan. *Land Use Policy* 58, 145–151.
- Nagasaka, K., Böcher, M., Krott, M., 2016b. Science-policy interaction: Who does what. In: Case of the Forest and Forestry Revitalisation Plan in Japan. Under review.
- Oreskes, N., 2004. The scientific consensus on climate change. *Science* 306 (5702) 1686.
- Palmer Fry, B., 2011. Community forest monitoring in REDD+ : the ‘M’ in MRV? *Environ. Sci. Pol.* 14, 181–187.
- Pasgaard, M., 2015. Lost in translation? How project actors shape REDD+ policy and outcomes in Cambodia. *Asia Pac. Viewp.* 56, 111–127.
- Pielke, J.R., A., R., 2007. The Honest Broker: Making Sense of Science in Policy and Politics. Cambridge University Press, Cambridge.
- Romijn, E., Herold, M., Kooistra, L., Murdiyarso, D., Verchot, L., 2012. Assessing capacities of non-Annex I countries for national forest monitoring in the context of REDD+. *Environ. Sci. Pol.* 19, 33–48.
- Romijn, E., Lantican, C.B., Herold, M., Lindquist, E., Ochieng, R., Wijaya, A., Murdiyarso, D., Verchot, L., 2015. Assessing change in national forest monitoring capacities of 99 tropical countries. *For. Ecol. Manag.* 352, 109–123.
- Rwanda, T.R.O., 2013. Update and upgrade of WISDOM Rwanda and Woodfuels value chain analysis as a basis for the Rwanda supply master plan for fuelwood and charcoal. pp. 173.
- Schusser, C., Krott, M., Movuh, M.C.Y., Logmani, J., Devkota, R.R., Maryudi, A., Salla, M., 2016. Comparing community forestry actors in Cameroon, Indonesia, Namibia, Nepal and Germany. *Forest Policy Econ.* 68, 81–87.
- Somorin, O.A., Visseren-Hamakers, I.J., Arts, B., Sonwa, D.J., Tiani, A.-M., 2014. REDD+ policy strategy in Cameroon: actors, institutions and governance. *Environ. Sci. Pol.* 35, 87–97.
- Sonwa, D.J., Weise, S.F., Coulibaly, O.N., 2009. Contribution of traditional knowledge developed by farmers to control pests and diseases in cocoa agroforests in southern Cameroon. *IUFRO World Series* 23, 14–20.
- Sufo Kankeu, R., Sonwa, D.J., Eba'a Atyi, R., Moankang Nkal, N.M., 2016. Quantifying post logging biomass loss using satellite images and ground measurements in Southeast Cameroon. *J. For. Res.* 1–12.
- Sufo Kankeu, R., Tsayem Demaze, M., Sonwa, D.J., 2019. Using local capacity to assess carbon stocks in two community Forest in South-East Cameroon. *J. Sustain. For.* 1–20.

- Tchatchou, B., Chia, E.L., Sufo Kankeu, R., Terán, A.S.P., Tiani, A.M., Sonwa, D.J., Kengoum, F., Locatelli, B., Mekou, Y.B., Munoh, A., 2015. Changement climatique dans le Bassin du Congo: Informations et connaissances échangées entre les acteurs. In: Bogor. Center for International Forestry Research (CIFOR), Indonesia.
- Tsayem Demaze, M., Ngoufo, R., Tchawa, P., 2015. Du savoir vers le savoir-faire: évolution de la conception de la REDD+ et contraintes à sa mise en œuvre en Afrique centrale. Nat. Sci. Sociétés 91–101.
- Warburton, H., Martin, A., 1999. Local people's Knowledge in Natural Resources Research. Natural Resources Institute, Chatham, UK.
- Warren, D.M., 1991. Using Indigenous Knowledge in Agricultural Development. World Bank, Washington.