



Anticipating social equity impacts in REDD+ policy design: An example from the Democratic Republic of Congo

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ABSTRACT

Equity is a sensitive topic discussed under the REDD+ mechanism. This study focuses on the impact of prevailing social and ecological conditions on the potential equity outcome of REDD+ intervention at the local level. Working at a REDD+ pilot project site in the Democratic Republic of Congo, we present a quantitative framework to assess contextual equity at the village level. We conducted a full community census on household characteristics and livelihood practices to evaluate current social conditions. We used participatory mapping and remote sensing analysis of a time series of very high resolution imagery over a 10-year period within the village boundaries to examine the ecological context of land use. We identify important differences between 379 households in terms of social characteristics and livelihoods practices. Social differentiation strongly relates to customary land rights as well as gender, ethnicity and origin. Using this case study, we find REDD+ activities that can be implemented under the prevailing ecological conditions could impact community members differently, by reducing access to land for a segment of the population that is already under stress, and therefore have implications on equity in both space and time. We identify important risks for sectors of the population that do not have the contextual features necessary for benefitting from REDD+ implementation and may be impacted, directly and indirectly, by decisions linked to benefit-sharing. We argue that such quantitative assessment is valuable to inform REDD+ policy design on the way livelihood practices and social characteristics are inter-linked and how they affect forest cover change. This information can be used to anticipate potential equity issues that may arise with REDD+ implementation. We suggest that contextually informed definitions of the benefits and costs are critical for achieving equity in benefit-sharing. A flexible adaptive management and equity conscious approach is recommended from the policy design to implementation, by anticipating and mitigating potential risks of REDD+ interventions in order to promote equitable outcomes at the local level.

1. Introduction

Concerns have been raised globally about the potential impacts of policies aimed at Reducing Emissions from Deforestation and forest Degradation (REDD+) in developing countries at the local level, particularly on indigenous and forest dependent communities (Angelsen et al., 2012; Cotula and Mayers, 2009; Luttrell et al., 2013; Isyaku et al., 2017). Depending on their design and implementation, REDD+ interventions present risks since they have the potential to affect rural people's livelihoods by imposing new restrictions on access to valuable resources, by removing decision-making autonomy on resource use and by undermining long-established traditional forest management

regimes (Peskett, 2011; Ribot and Larson, 2012).

Discussions to avoid harm and create co-benefits in communities where poor and vulnerable people depend on forestland for their livelihoods is among the most sensitive topics linked to REDD+ activities (Brown et al., 2008; Peskett et al., 2006). Concerns about its potential impacts have led to the adoption of REDD+ social safeguards that recognize the need for the full and effective participation of indigenous peoples and local communities, for respecting their knowledge and rights, and for the enhancement of social benefits (UNFCCC, 2010).

Trade-offs have been identified in the REDD+ context between the environmental effectiveness in reducing carbon emissions, the cost-efficiency of mitigation activities implemented, and equity between those

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who benefit and those who assume the costs, (known as the 3E criteria: for effectiveness, efficiency, and equity) (Angelsen et al., 2009). If maximizing the reduction of emissions at the lowest cost possible is a valuable goal for addressing climate change, the potential consequences of REDD+ interventions in terms of social equity cannot be ignored.

McDermott et al. (2013) provide a conceptual framework that identifies three dimensions of equity: distributional, procedural, and contextual equity.

Distributional equity refers to the distribution of benefits and costs of REDD+ program among stakeholders through the creation of benefit-sharing mechanisms in REDD+ participating countries. It focuses on the fairness of the REDD+ outcome. Benefit-sharing mechanisms encompass the institutions and governance structures that deal with the distribution of REDD+ costs and benefits (financial and non-financial). It is of crucial importance in the design of REDD+ intervention as a means to incentivize behavioral change that will address the drivers of deforestation and forest degradation, leading to climate change mitigation benefits (Weatherley-Singh and Gupta, 2015). Different goals and rationales have been proposed about who should benefit from REDD+ and why they should receive incentives, highlighting the perception that equity is taking shape differently among actors (Schroeder and McDermott, 2014). Previous studies have categorized different rationales for the distribution of benefits and have analyzed their potential consequences in case-study countries (McDermott et al., 2013; Luttrell et al., 2013; Pascual et al., 2010; Pham et al., 2013).

Procedural equity, on the other hand, addresses the perceptions of fairness and legitimacy of the political processes that lead to decision-making (Tyler, 2011) and relates to representation, participation, inclusion, and recognition in decision-making processes. This dimension of equity focuses on the fairness of the process. Procedural equity has been discussed in the REDD+ context in relation to the establishment of standards that respect the principle of free, prior and informed consent (FPIC) (Colchester and Ferrari, 2007; Brown et al., 2008) and the participation of indigenous and local communities to the design and implementation of REDD+ interventions (Holmes and Potvin, 2014).

The third dimension, *contextual equity*, concerns the pre-existing conditions that enable or restrain participation in decision-making processes, the access to resources and the resulting benefits. Rarely addressed, this structural dimension invites policy makers to take into account the social and political context at the root cause of inequality when designing REDD+ interventions at the local level (Di Gregorio et al., 2013; Pasgaard et al., 2016).

Important linkages between these three dimensions of equity exist. For instance, the way decisions are made can also have an impact on outcomes, namely the distribution of benefits. Democratic, interactive and deliberative processes for local participation have been identified as central to help understand the needs and aspirations of the rural poor, define benefits and in the design of benefit-sharing mechanisms (Gebara, 2013; Ribot and Larson, 2012) so that the outcomes can be perceived as fair. Experiences in community forest management show that fair representation and active participation of the poor, indigenous and women is an essential component to promote equitable outcomes at the local level (Mahanty et al., 2009; Schreckenber and Luttrell, 2009; Pelletier et al., 2016).

Despite being identified as an essential component of REDD+ success (as one of the 3E criteria), quantitative assessments of equity at the local community level has been lacking. Furthermore, the question of how to evaluate contextual equity and link it to policy tools to address distributional equity has not been answered.

Expanding on the notion of contextual equity, this paper proposes a framework to quantitatively assess contextual equity of the socio-ecological system using mixed methods. Under this framework, the social and ecological prevailing conditions are quantitatively assessed, without resorting to prior assumptions. For the social context, we use multivariate statistical analysis on a full household census to answer three main questions: (1) Can we identify differences between

households based on social characteristics and on livelihood strategies at the village level? (2) What are the factors implied in this social differentiation? (3) Is there a relation between social characteristics and livelihood strategies? To assess the ecological context, we use participatory mapping and a time series of remote sensing images to assess forest cover change and the agricultural dynamics inside the village boundaries. This framework was tested at a REDD+ pilot project site in the Democratic Republic of Congo (DRC), but it can also be applied to other areas.

Using the results from this case study, we examine how prevailing ecological and social conditions could potentially affect the equity outcome of a REDD+ intervention, *inter alia* by examining different options for benefit-sharing already developed in the literature. We argue that these prevailing conditions can be assessed, even quantitatively, and that this contextual information is important in REDD+ policy design to prevent unintended consequences in benefit sharing at the village level. We wish to clarify that the REDD+ mechanism is not prescriptive on how emission reductions can be achieved. The REDD+ intervention that we evaluate with this study, with a village-level pilot project, is only one type of policies and measures that developing countries can implement to reduce emissions or increase absorptions.

Here we provide an overview of forest governance in the DRC, a key player in the REDD+ climate change mitigation efforts. We set the stage of the REDD+ pilot project case study and describe the field data collection methodology as well as the statistical and remote sensing analysis performed in the Materials and Methods section. Results from our replicable quantitative approach are presented for both social and ecological conditions and followed by a discussion of the potential equity impacts of those assessed conditions under different benefit-sharing options.

1.1. Forest governance and REDD+ in the DRC

The DRC hosts about half of the second largest tropical humid forest in the world (de Wasseige et al., 2014) and has experienced a historically low annual rate of deforestation of 0.2% (Duveiller et al., 2008; de Wasseige et al., 2010), with gross forest cover loss of 37,118 km² for the 2000–2010 period (Potapov et al., 2012). Forest degradation could however affect up to three times more area than deforestation alone (Shapiro et al., 2016; Tyukavina et al., 2013). Shifting cultivation drives the current patterns of forest cover loss (Defourny et al., 2011; Molinario et al., 2015). Future land-use scenarios project increased deforestation driven by population growth and expansion of commercial agriculture, timber and minerals extraction driven by global demand (Galford et al., 2015; Mosnier et al., 2014; Phelps et al., 2013).

In the DRC, forests are owned by the state, which recognizes local communities' customary user rights to land and forest resources (German et al., 2009; Mpoyi et al., 2013). The 2006 constitution recognize customs as source of rights and is used to rule and regulate human relationships, as long as the local customary rules do not contradict statutory law and conform with public order, right and equity (Mashini Mwatha, 2011). While the state claims ownership of all forestland, in rural areas, customary institutions govern forest and land resources in practice (Debroux et al., 2007; Bernard and Gélinas, 2014). These customary institutions differ widely across the DRC but generally land rights are transferred through patrilineal inheritance and confirmed by clearing a piece of forest for agriculture under customary law (Samdong and Nhantumbo, 2015). In many areas, women cannot hold land rights independently of their husbands and other male relatives (Gouzou et al., 2009; Stiem and Krause, 2016) and restrictions also apply to Batwa¹ indigenous people, though information differs among

¹ The Batwa is an ethnic group more commonly referred to as "Pygmy" in the region. They are also referred to as *Peuples Autochtones* (PA) in French, which means indigenous people.

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