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Article

Learning From 'Actually Existing' REDD+: A Synthesis of Ethnographic Findings

Sarah Milne[a], Sango Mahanty[a], Phuc To[a], Wolfram Dressler[b,#], Peter Kanowski[c], and Maylee Thavat[a]

[a]Crawford School of Public Policy, College of Asia and the Pacific, Australian National University, Canberra, Australia

[b]School of Geography, University of Melbourne, Melbourne, Australia

[c]Fenner School of Society and Environment, College of Science, Australian National University, Canberra, Australia

[#]**Corresponding author. Email:** wolfram.dressler@unimelb.edu.au

Abstract

The 2015 United Nations Paris Agreement on Climate reinforces actions to conserve and enhance forests as carbon reservoirs. A decade after sub-national demonstration projects to reduce emissions from deforestation and forest degradation (REDD+) commenced, we examine why many REDD+ schemes appear to have fuelled social conflict while having limited success in addressing the drivers of forest loss and degradation. Our analysis is two-tiered: first we synthesise findings from a set of ethnographic case studies of REDD+ in Mainland Southeast Asia, conducted by the authors; second, we explore whether the insights from our regional synthesis apply globally, through a comparative review of published qualitative research on REDD+ field experiences. Our results reveal three major implementation dynamics that can undermine REDD+ in practice, which we conceptualise from science and technology studies and critical political ecology as follows: 1) problems with the *enrolment* of governments, civil society, and local forest users in REDD+ governance; 2) the prevalence of overly simplified *codification* systems for REDD+ implementation that mismatch targeted societies and landscapes; and 3) the consequent *dissonance* between REDD+ objectives and outcomes. Together, these problematic dynamics reveal how and why REDD+ so often misses its targets of reducing deforestation and delivering community benefits. In effect, it appears that REDD+ in the course of implementation maps onto local power structures and political economies, rendering it blunt as tool for change. The potential of REDD+ as a 'solution' in the global climate regime must therefore be scrutinized, along with other similar mechanisms espoused by the green economy.

Keywords: Carbon, climate change, forests, governance, REDD+, ethnography

INTRODUCTION

Actions to reduce greenhouse gas emissions from deforestation and forest degradation (REDD+) are now central to global climate governance. The pledge of new funding to conserve, restore and manage forests through REDD+ is a key aspect of the 2015 United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, now ratified by 170 countries (UNFCCC 2017). This represents a significant level of international commitment to REDD+, which in turn, demands a clear understanding of its implementation challenges. Early evidence from REDD+ projects suggests major challenges, including: ongoing weak enforcement of domestic laws on forests and land, leading to limited effectiveness (Mahanty et al. 2015; Vongvisouk et al. 2016); contestation or conflict over property rights and community benefits (Pasgaard 2015; Asiyanbi 2016; Corbera et al. 2017); as well as securitisation and violence, often perpetrated by government agencies (Cavanagh et al. 2015; Howson 2018). In this article, we comprehensively explore these challenges

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through a synthesis of ethnographic knowledge on REDD+ implementation dynamics to date. Our approach is novel because no other reviews of REDD+ have yet been drawn from anthropological methods, which can offer vital new insights on climate governance (Barnes et al. 2013; Castree et al. 2014; McGregor 2015).

REDD+ has evolved from relatively small site-based or sub-national schemes under the voluntary carbon market, now to include national government programmes that broadly aim to influence forest management systems and deliver multiple co-benefits alongside carbon conservation (Simonet et al. 2015; Angelsen et al. 2017; Turnhout et al. 2017). In this context, co-benefits may include community rights, local livelihoods and biodiversity conservation (Visseren-Hamakers et al. 2012). This has produced a suite of complex technical and bureaucratic requirements for REDD+ implementation, which often falls under the donor rubric of 'performance-based aid' where payments are conditional upon results (Savaresi 2016; Angelsen 2017). Yet in spite of REDD+'s new complexity, its underlying logic remains the same: to use market mechanisms or economic incentives to compel state, non-state and local actors to conserve carbon stocks by avoiding deforestation and forest degradation. This means that lessons learned from the last decade of 'actually existing' REDD+ projects should inform implementation protocols under the new climate regime. We adopt the term 'actually existing' after Brenner and Theodore (2002) to denote the embeddedness and path-dependence of REDD+ in practice—in other words, the ways in which REDD+ becomes absorbed and transformed by local social and political conditions.

To date, most comparative analysis of REDD+ has focused either on policy design options, or on the discourses and socio-political processes surrounding policy adoption at the country level (e.g., Cerbu et al. 2011; Vijge et al. 2016; Brockhaus et al. 2017). Synthesis of REDD+ experiences at the sub-national level in six countries has also been conducted by the Centre for International Forestry Research, under its Global Comparative Study (Sills et al. 2014). But important ethnographic research that provides nuanced and independent accounts of REDD+ on the ground, including its local impacts and outcomes, remains unsynthesised across diverse sites and countries. We address this knowledge gap by proceeding in two stages: first, we develop a comparative analysis of our own ethnographic work on REDD+ in Cambodia, Laos, and Vietnam, published over the last five years, which enables the identification and theorisation of key recurring themes in REDD+ implementation; and second, we conduct an extensive review of methodologically similar REDD+ case studies published in the global literature, testing for the prevalence and relevance of our key findings from Southeast Asia (see Methods).

Importantly, our approach reveals that it is possible and worthwhile to synthesise the diverse results of ethnographic work, in order to suggest key general insights for REDD+ practitioners. Our review and synthesis reveal that there are fundamental constraints to REDD+, which must be addressed if UNFCCC aspirations under the Paris Agreement are to be realised. These constraints relate partly to practical difficulties in meeting high expectations around REDD+, and how they have led to local expressions of discontent. They also relate to the dominant technical framing of REDD+, which has been crucial for its wide appeal among international and national policy actors, yet detrimental for its ability to tackle entrenched political-economic drivers of forest loss.

THEORETICAL FRAMEWORK

Our analysis of REDD+ is informed by literature that attends to the social processes, political dynamics and complex effects of environmental governance (e.g., Callon 1986; Scott 1998; Castree et al. 2014). Drawing from this literature, we set out to examine REDD+ as a multi-scale and politically embedded intervention, which engages diverse actors, practices, and institutions. In light of our published empirical findings, this approach led us to adopt three 'orienting themes' (Layder 1998) to guide further analysis and synthesis. Each theme refers to a different aspect of REDD+ implementation—enrolment, codification, and dissonance—which we explain below.

Enrolment refers to the processes by which diverse actors, like individuals, groups or agencies, come together in the name of a particular project or cause (Latour 1987). It requires the alignment of interests and actions among networked actors; and, as Latour explains, it is an inherently political act, crucial to the success of policy implementation. The concept of enrolment can explain the development and dissemination of REDD+ over the last decade, and in particular how the idea has changed to accommodate the interests of diverse actors (Milne et al. 2016). For example, when REDD+ was launched in 2007 (COP13 2007), it was promoted as a pragmatic and cost-effective way for wealthier countries to offset emissions by paying poorer tropical countries to conserve forests and carbon (Stern 2006). Since then, the development of site-level and national-level REDD+ initiatives has required the buy-in of national, sub-national and local actors in various activities such as 'demonstration sites' and 'REDD+ readiness', with a strong emphasis on policy, capacity building and technical support (Brockhaus and Di Gregorio 2014).

These extensive enrolment processes, however, have led to relatively limited translations of the REDD+ idea into *actual projects* on the ground. Although USD 9 billion was pledged by donor governments through the UNFCCC for REDD+ implementation by 2015 (Lee and Pistorius 2015), these funds have only been partially realised, and are considered insufficient to secure forests given their importance for climate change mitigation (Houghton et al. 2017). Confusion also exists over the extent to which REDD+ implementation translates into field activities. For instance, the most comprehensive global database of REDD+ projects suggests that there are 454 REDD+ projects in existence across 56 countries, but only 344 of these are considered active (Simonet et al. 2016). Nevertheless, this still implies significant levels of implementation activity, which, after the enrolment of key actors, leads to a range of codification practices.

Codification refers to the ordering of knowledge and practice that happens when technical plans or policies are implemented. REDD+ systems of codification arise from the procedures used to measure, classify and govern forested lands, such as mapping and boundary demarcation (Turnhout et al. 2015). Codification also arises from the demands of compliance with REDD+ standards and reporting systems for social safeguards, as well as protocols for monitoring, reporting and verification of carbon stocks (Angelsen et al. 2012). Importantly, these REDD+ systems interact with pre-existing codifications of land and forests, which are known to have particular political and territorial effects (Mahanty et al. 2013). For example, Scott (1998) shows how nuanced knowledge of local contexts must be simplified and made 'legible' in order for the state apparatus to be able to intervene in land and forest management. This represents a powerful form of codification or 'rending technical', which underpins interventions in complex resource-use settings and can sideline local voices (Li 2007). Similarly in Southeast Asia, scholars have observed how state-backed efforts to proscribe and control resource use, particularly on forested lands, can produce 'territorialisation' processes that enhance state power and diminish local rights (Vandergeest and Peluso 1998). This literature on the material and discursive workings of land and forest interventions applies directly to REDD+, whose new codification systems may well extend state power (Leach and Scoones 2013), or erase customary claims to forested land (Milne 2012). Thus, the effects of REDD+ codification are inevitably political, meaning that they can lead to conflicts, confusion and dissonance in project outcomes.

Dissonance is the term that we use to describe how REDD+ in practice can produce incongruities between intentions and outcomes. This problem has long been observed in development practice, and it results specifically from either failure in enrolment (Mahanty 2002) or the inability of codification systems to account for local complexity (Long 2001). Thus, as REDD+ becomes entangled with wider processes of government and agrarian change, its normative technical assumptions and approaches can quickly become inadequate (Mahanty et al. 2013, 2015). In such circumstances, REDD+ is typically overwhelmed by the broader drivers of forest loss, such as agricultural expansion and infrastructure projects, which emerge from entrenched political and economic interests. These dynamics lead to dissonance between the stated objectives and emerging outcomes of REDD+, as evidenced by local social tensions and ongoing forest loss around many of the project sites that feature in this review.

METHODS

This study used two levels of analysis to distil key insights on REDD+ in practice. First, we conducted a comparative analysis of our three ethnographic REDD+ cases in mainland Southeast Asia, referred to as the 'case studies.' Second, we assessed the extent to which our findings in Southeast Asia resonated internationally, through a structured, comparative review of REDD+ cases beyond our study sites, referred to as 'reference cases.' The reference cases were selected for their use of ethnographic or qualitative methods, to ensure methodological comparability to our own case studies. Our approach to *synthesising* disparate ethnographic research, explained in detail below, is unique in the global REDD+ literature. It represents an important complement to other comparative and systematic review work on REDD+, which has used more structured or deductive or quantitative methods (e.g., Cerbu et al. 2011; Minang et al. 2014; Sills et al. 2014; Sunderlin et al. 2015; Brockhaus et al. 2017). While we have drawn inspiration from systematic review approaches (e.g., Minang et al. 2014), our approach is more inductive, as explained below.

Comparative analysis of case studies

Our original empirical work examined REDD+ implementation in the mainland South East Asian countries of Cambodia, Laos and Vietnam. These countries' forests are regionally important yet are under significant pressure (FAO 2011), meaning that donor investment in REDD+ has been substantial. In each country, where the socio-political contexts are comparable yet distinct, we studied one REDD+ demonstration site and its attendant cross-scale policy processes (see Table 1). Between 2013 and 2015, ethnographic data were gathered in each country through: 1) semi-structured interviews with government personnel, project staff, key informants and villagers at project sites; 2) focus groups with villagers; and 3) participant observation at REDD+ sites and meetings. Several peer-reviewed papers elaborate further on our research methods and specific findings at each site (Milne 2013; Dressler et al. 2014; Mahanty et al. 2015; Milne 2015; Mahanty and Milne 2016; Neimark et al. 2016; To et al. 2016, 2017). This material provides the basis for our comparative analysis and it informs the structured review of reference cases.

The initial comparative analysis took place in late-2015, during a two-day Synthesis Workshop that involved all

Table 1
Country and project information for Cambodia, Laos and Vietnam REDD+ Case Studies

Country	Forest area (million ha)[+]	Number of REDD+ official demonstration projects	REDD+ finannce committed (millon USD)[#,++]	Case study: years of operation	Case study: project facilitation
Cambodia	9.457	3*	101.9*	2010-ongoing	NGO[^] with government
Laos	18.765	7[§]	90[§]	2009-ongoing	Donor with government
Vietnam	13.862	5[|]	84.3[|]	2012-2015 (ongoing donor funding being considered)	NGO with government

Notes: [+]FAO 2015, *UNDP Campodia 2013, [§]Lao Department of Forestry 2013, [|]Forest Trends 2015, [#]The REDD Desk 2016, [++]These are the best available, indicative estimates that cover both REDD+ readiness and field activities. [^]Non-governmental organisation.

authors of this article. The workshop provided an opportunity to contrast and compare our case studies, and to discuss how our key findings might be tested or extended more broadly, in the form of a structured, comparative review. To do this, we followed an inductive approach, identifying and coding key patterns in our case study data, ultimately to develop the broader 'orienting themes' (Layder 1998): enrolment, codification and dissonance. These themes were chosen deliberatively during the workshop through detailed discussions, debates and reflections, which positioned our findings vis-à-vis the team's decades of academic and policy-related work in mainland Southeast Asia. We then developed a table, listing our case study evidence under each theme. From this list of evidence, a set of broadly applicable *indicators* was then derived (as discussed below). The orienting themes and their respective indicators were then used to structure our review of the reference cases.

Selection and overview of the reference cases

Having conducted the comparative analysis of our Southeast Asian cases studies, the next step was to test how applicable and meaningful our findings were with reference to the wider literature. To do this, we identified a set of reference cases that used qualitative and/or ethnographic methods, to which our analytical themes and indicators would be applied. The search for reference cases was conducted across a broad range of social science journals, reflecting mainly the disciplines of geography and anthropology. Articles were identified through a structured, standardised review of scholarly databases, using consistent search terms across the databases (see Table 2). Subsequently, one author initiated (with the other authors verifying and qualifying) a two-staged short-listing process to choose the final set of reference cases. From an initial search result of 210 articles, 53 reference cases were chosen for analysis (listed in Supplementary Table 1). The reference cases represent 20 countries from different regions (40% Africa, 17% Americas, 36% Asia, and 7% Pacific), as shown in Figure 1. Within the 53 articles, 42 distinct REDD+ project sites are covered. This is because there were seven national-level analyses in the set, and four REDD+ projects that featured in more than one reference article. This overlap was allowed, as distinct analytical themes were covered in each reference case.

To validate our sample, we then cross-checked it with recognised global REDD+ databases (e.g., Simonet et al. 2016; CIFOR 2018; REDD Desk 2018). These databases vary greatly in scope, often listing inactive or proposed REDD+ projects, or other forest carbon projects that do not adhere to REDD+ standards, making it hard to identify the true number of 'actually existing' REDD+ projects. However, the cross-checking process indicates that our sample is robust and represents a broad suite of REDD+ project types and locations. For example, our 2016 sample covers REDD+ in 20 countries (see Figure 1), while The REDD Desk in 2018 lists a total of 29 countries where REDD+ Readiness is underway or completed. The discrepancy in country coverage is due to the fact that we are only examining sites where REDD+ has been *actually implemented* at a field level, and for a sufficient time period to allow for ethnographic observations and publications to be made. We are therefore confident that our sample covers at least two thirds of the 'actually existing' REDD+ projects in 2016.

Notably, our selection of reference cases that use qualitative and/or ethnographic methods means that they tend to reflect their authors' detailed local knowledge of REDD+ sites, along with open-ended or unstructured observations of REDD+ effects. This means that the subtle impacts or unintended consequences of REDD+ are more likely to be detected, leading perhaps to a more critical stance. This is not a selection bias, but a methodological phenomenon—herein lies the importance of attempting to synthesise insights from ethnographic research on REDD+.

Table 2
Reference case selection strategy

Search terms	REDD; REDD and case studies; REDD and [country] case study; forest carbon and [country] case study
Databases searched (result=210 papers)	BioOne, Blackwell, Cambridge Journals Online, Elsevier, Proquest, ScienceDirect, Springerlink, Taylor and Francis
Criteria to shortlist reference cases (result=137 papers)	1) Addressed a UN-REDD (United Nations collaborative initiative on REDD+) country (UN-REDD 2016), as these will be targeted for REDD+ under UNFCCC; 2) blind peer reviewed, as a proxy for quality; 3) had a single country focus+ to ensure sufficient contextual depth; and 4) used a quantitative/ ethnographic methodology, to ensure comparability.
Criteria to select final reference cases (result=53 papers)	1) Clear focus on REDD+ implementation, rather than on lessons learned from similar schemes (e.g., community forestry) or preparatory assessment of future REDD+ implementation; 2) analysis of REDD+ projects situated within the context of social, political, and economic drivers of environmental change; and 3) fine detail on local dynamics and/or REDD+ policy processes.

Notes: +With exception of two studies that covered two neighbouring countries, and were included as they had sufficient ethnographic depth

Synthesis of ethnographic findings using indicators

With the reference cases chosen, the final stage of analysis was to assess the extent to which the indicators from our field studies were applicable, and if so, discussed and/or present at other REDD+ sites. A list of 42 indicators was used in this process: most of them were categorised under the three orienting themes of enrolment (14 indicators), codification (10 indicators) and dissonance (5 indicators), while others simply reflected REDD+ project conditions and configurations (13 indicators). The full set of indicators is listed in Supplementary Table 2, along with their prevalence across the 53 reference cases. We considered prevalence in two ways: 1) whether the indicator was discussed in the reference case (yes/no); and 2) whether the indicator was present in the

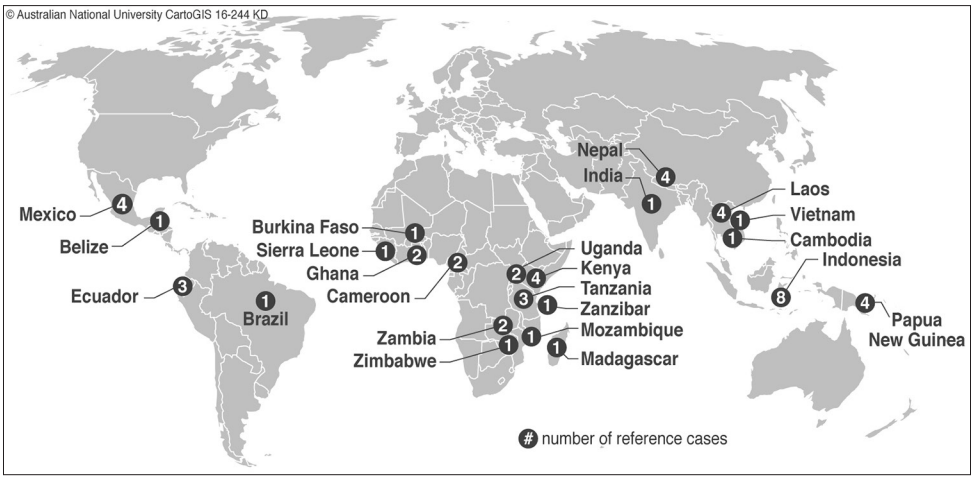

Figure 1
Location of reference cases

REDD+ site being analysed (yes/no). Substantive analytical attention and/or evidence was required in the reference case for presence of the indicator to be counted as 'yes'. In addition, to count indicators of local views and perceptions, some coding was required (e.g., positive, negative, neutral, or confused).

Finally, a subset of the most pertinent indicators, to be used for the synthesis, was selected. This subset was chosen using an iterative process conducted by the authors, to ensure that the following three components were reflected: 1) the most salient findings in our empirical material on REDD+, relating to REDD+ processes and their social and environmental impacts; 2) the most prominent or recurring issues emerging in the ethnographic literature on REDD+, as seen in the frequency with which indicators were discussed and/or present; and 3) key recurring discussion points at major international REDD+ technical meetings, including the UNFCCC Conference of Parties gatherings (see Atela et al. 2016), and other international REDD+ technical exchange meetings (e.g., I-REDD 2014; NORAD 2016). This subset of indicators is shown in Table 3, labelled according to the analytical theme under which they are found: enrolment (E1, E2, E3), codification (C1, C2, C3, C4), and dissonance (D1, D2, D3, D4). Overall, the indicators show *problems* with enrolment, *processes* of codification, and *evidence* of dissonance.

As per standard practice, we use indicators as proxies to suggest the presence of certain conditions or patterns at a given point in time (see Kaufmann et al. 2011). Indicators are not absolute or accurate measures of variables. Rather, they are an analytical tool, used here to convey and summarise key aspects of REDD+ implementation that are not necessarily covered in conventional quantitative or deductive studies. Our approach of applying indicators to synthesise ethnographic/qualitative findings is novel, but important—it helps to reveal the more subtle yet prevalent socio-political effects of REDD+ implementation, which would otherwise be hard to measure systematically.

RESULTS

Here we discuss the evidence for and significance of *enrolment*, *codification* and *dissonance*, as three key aspects of REDD+ implementation that emerge from ethnographic research. Under each theme, we explore the evidence from our case studies in Southeast Asia, alongside a synthesis of findings from the 53 reference cases. The indicators are deployed to give structure to the analysis, with key results for each orienting theme summarised in Table 3. In general, we find a high correspondence between our findings on REDD+ implementation in Southeast Asia, and experiences elsewhere; but we also discuss differences and apparent anomalies.

Enrolment

The enrolment of actors in REDD+, crucial for project efficacy, takes place through a variety of mechanisms, including the provision of international donor finance for implementation; the conduct of stakeholder consultation processes, including Free Prior and Informed Consent (FPIC); and the provision of financial incentives and co-benefits to forest users. Our case studies and the reference cases indicate that these enrolment processes have been widely implemented, but with variable results and some blockages.

In light of our findings, we identify three indicators that reflect the difficulties associated with achieving enrolment in REDD+ project processes. These are: local confusion or lack of awareness of REDD+ (E1); failure of project proponents to deliver financial benefits to local actors, often in spite of local expectations (E2); and the presence of negative local views of REDD+ (E3), which emerge not just from the dashed hopes of local communities, but also from actors who benefit from forest clearing and are resistant to conservation measures.

While our indicators mainly reflect local level processes, it is important to note that enrolment also happens through

Table 3
Subset of indicators used in the synthesis

Key indicators	No. cases indicator discussed (*N*)	No. cases indicator present (*n*)	Indicator prevalence across all cases (%) (*n*/53)	Indicator prevalence in relevant subset of cases (%) (*n*/*N*)
Problems with enrolment				
E1. Local confusion or lack of awareness of REDD+	33	18	34%	55%
E2. Financial benefits not delivered to local actors	34	19	36%	56%
E3. Negative local views of REDD+	33	14	26%	42%
Processes of codification				
C1. Implementation of MRV systems	32	19	36%	59%
C2. New boundaries demarcated as part of REDD+	40	28	53%	70%
C3. REDD+ influence on local tenure arrangements	40	22	42%	55%
C4. State property demarcation as part of REDD+	38	14	26%	37%
Evidence of dissonance				
D1. Social tension and conflict due to REDD+	39	36	68%	92%
D2. Ongoing forest clearance in the target area	34	31	58%	91%
D3. Problems with leakage	7	4	8%	57%
D4. Violation of new REDD+ boundaries	28	20	38%	71%

transnational and national policy processes. For instance, international investment in country-level REDD+ 'readiness' activities is a primary mechanism to enrol national and civil society actors. In our case studies, these investments positioned donors to drive the development of national REDD+ strategies, demonstration activities and 'Readiness Preparation Proposals' as preconditions for further financing. In tandem, donors also supported new institutional alignments that attempted to integrate pre-existing national policies with REDD+ and/or to establish new governmental REDD+ task forces. International and regional meetings, as well as donor-funded capacity building and study tours, further inducted national policymakers and civil society actors into REDD+ discourses (see Brockhaus and Di Gregorio 2014). Indeed, these activities developed a formidable REDD+ bureaucracy in our case study countries. Yet state enrolment was only ever partial, since the government REDD+ processes were often sidelined from higher level decision-making responsible for driving land-use change and forest loss in practice (Pham et al. 2014; Mahanty et al. 2015; Angelsen et al. 2017). For this reason, REDD+ has struggled to influence processes that drive deforestation in our case studies. International finance has clearly played a similar role in the reference cases, with all but three countries reporting the use of donor funds for the development of national REDD+ strategies and systems (Supplementary Table 2). Although partial or internally conflicted state enrolment was not detectable in our indicators, the observed challenges of REDD+ implementation do suggest that this problem extends beyond Southeast Asia, as we discuss under the theme of dissonance.

At the local level, enrolment is frequently achieved through consultation processes like FPIC, which is now required for voluntary carbon schemes and emphasised in international and national REDD+ frameworks (Peskett and Todd 2013). While FPIC was implemented at all of our case study sites, we found that local participants typically remained confused about REDD+ objectives or unaware that REDD+ projects were underway (see Indicator E1 'local people confused or unaware of project'). In Cambodia, for example, after village consultations and independent legal advice, consent was formalized through a FPIC signing ceremony in 2013 (Mahanty et al. 2015). Yet, while local brokers such as village heads were actively enrolled through the FPIC process, REDD+ knowledge remained weak in the wider community. Similarly, in Laos and Vietnam, FPIC did not facilitate informed local decisions about REDD+. Our research suggests two major reasons for this: 1) inherent challenges in conducting FPIC in socially diverse and politically contested environments, and 2) an over-emphasis among REDD+ actors on producing evidence for safeguard or standards compliance rather than substantive local engagement (Milne and Mahanty, In Press). Similar patterns are observed among the reference cases, with 62% of cases having implemented some form of local consultation process (Supplementary Table 2). And, among reference cases discussing local views on REDD+, 55% of these reported local confusion or lack of awareness of REDD+ (see E1, Table 3). In part, these high levels of local confusion may be due to project implementers' own doubts about the future of REDD+ and associated financing, which have disrupted implementation to some extent (Sills et al. 2014).

After local consultations, the delivery of REDD+ benefits to local actors is another key mechanism for enrolment. In our case studies, the promise of local benefits—both carbon revenues and non-financial 'co-benefits' like livelihood activities and communal land titles—was critical to community-level enrolment in REDD+. However, the financial component of these promised benefits was not delivered in our three case studies, which led to local scepticism (see Indicator E2 'Financial benefits not delivered'). Furthermore, several of the promised co-benefits were either unrealised or they

generated unanticipated negative outcomes. In Vietnam, for example, villagers pursued land titles through the REDD+ project, but they used these to extract timber and expand cash crop cultivation, leading to the perverse outcome of ongoing forest clearance (To et al. 2016, 2017). Similarly in Laos, farmers participating in REDD+ struggled to secure sufficient returns from livelihood co-benefit schemes (e.g., livestock production, agro-forestry) that were meant to offset the cost of new forest-use restrictions, leading in turn to more forest clearance (Dressler et al. 2014). In the reference cases, local financial benefits were unrealised in 56% of cases that discussed this issue (see indicator E2), particularly in Africa and Asia-Pacific, suggesting the global prevalence of this problem. This reflects the need for timely REDD+ financing to the local level, as other research on sub-national REDD+ has indicated (Sills et al. 2014).

Finally, a key measure of the success of local enrolment processes is how local people perceive REDD+. In our case studies, negative local views about REDD+ were found among a wide range of informants in all countries (Indicator E3, 'negative local view of project'). For some, this was due to the unrealised promises of tangible benefits. For others, there was a loss of hope about REDD+'s potential to address local aspirations and conditions in the face of ongoing deforestation. This was especially the case in Cambodia, where villagers who understood the government-endorsed goals of REDD+ could not reconcile these with what was happening on the ground: ongoing elite-backed forest loss in the project area due to new rubber concessions, illegal logging and land speculation (Milne 2015; Mahanty et al. 2015). Similarly, among the reference cases that discussed local views, local perceptions were largely negative (42%), with only two cases reporting positive perceptions (see Supplementary Table 2). Negative or neutral perceptions were particularly noted at sites where financial benefits had not materialized.

Codification

Codification refers to the processes of land-use classification, mapping, carbon accounting, and demarcation that happen in the forested domain where REDD+ is implemented. These processes are mainly required to generate evidence of compliance with internationally-defined systems of carbon accounting and REDD+ social safeguards, which involve standardised measures for land use change and land tenure as the basis for conditional payments (Milne and Mahanty, In Press). While such codification processes are often cast as technical-bureaucratic endeavours, this framing disguises their inherently political nature (Turnout et al. 2015). Scholars have long observed the 'anti-politics' that can emerge when complex socio-political processes are designated and simplified into technical problems that have technical solutions (Li 2007; Ferguson 1990). Thus, we discuss REDD+ codification systems with the knowledge that they entail certain power relations and are likely to produce social tensions, as complex land and forest uses are re-interpreted for the carbon market (Mahanty et al. 2013).

In the light of our case study findings, we identify four key indicators of codification processes that capture these political dynamics. These are: the implementation of systems to monitor, report, and verify (MRV) emissions reductions (C1); the demarcation of new boundaries as part of REDD+ (C2); evidence of REDD+ influence on local tenure arrangements (C3); the demarcation of state property as part of REDD+ (C4), as shown in Table 3, and as discussed below. Our focus is therefore upon site-level REDD+ codification processes and their effects. The related processes of carbon credit calculation, which use MRV data, occur off-site. We do not examine these processes, but other ethnographic inquiries have begun to show their contingent and political nature (e.g., Lippert 2015; Turnhout et al. 2015).

As indicated, systems for MRV provide the means to calculate carbon credits, and they are central to REDD+ codification processes. Accordingly, MRV attracted major international investment in each case study, and was discussed in 60% of reference cases (Supplementary Table 2). In our case study countries, the support of UN-REDD and other donors helped establish well-resourced national offices to integrate the latest international carbon accounting systems with Geographic Information System-based (GIS) forest data. Similar MRV implementation was reported among 59% of the reference cases that discussed MRV (see C1, Table 3). This confirms donor priorities that are in line with the establishment of technical infrastructure for REDD+.

The second main domain of codification relates to tenure interventions (C2, C3, C4), which are an inevitable consequence of the technical need to define and track areas of 'forest' and 'non-forest.' One of the expected co-benefits of REDD+ is clearer tenure and more secure land access, particularly for vulnerable groups (Larson et al. 2013; Sunderlin et al. 2014). This is reflected in the reference cases with 75% of cases discussing tenure issues. Furthermore, among those discussing tenure, 70% observed new boundary demarcation as a result of REDD+ (C2) and 55% reported REDD+ having an influence on local tenure arrangements (C3).

However, the simplification of tenure claims and boundaries through codification can also exacerbate social tensions and restrict local access rights, particularly where land claims overlap and/or where projects assist in the demarcation of state territories. The 'demarcation of state property' indicator (C4) is therefore used to examine whether REDD+ projects strengthen states' territorial authority on lands that were already under state tenure but being used informally. This occurred in all three of our case studies. In Cambodia, for example, the formalisation of indigenous land claims saw the issuance of communal titles that covered far smaller areas of land than what was customarily used, along with new conditions for local access to the state-owned protected forest (Milne 2013). In Laos, the convergence of REDD+ and state land use plans constrained local land access and increased competition for land, while benefiting village elites who could position

themselves to capture REDD+ co-benefits (Dressler et al. 2014). In Vietnam, the state restricted access to REDD+ forest areas, while providing limited lease rights in other areas (To et al. 2017).

Tenure interventions for REDD+ in mainland Southeast Asia can therefore reinforce wider state authority and territorialisation agendas, while intensifying inequities and restricting informal local access. This finding resonated across the reference cases where state tenure was pre-existing—37% of reference cases discussing the subject reported state boundary demarcation efforts due to REDD+, mainly in Asia and some in Africa, where forests are under state tenure. In contrast, the indicator was not evident for Latin American cases, where 33% of land is under indigenous ownership (RRI 2014), nor in the African cases where REDD+ had a highly localised focus with limited state involvement. Thus, the extent to which REDD+ facilitated state territorialisation (i.e., the deepening of state control over forests) depended on pre-existing tenure conditions and the scale of implementation, whether national or local.

In summary, to meet the data demands of carbon accounting and social safeguards, REDD+ implementation has involved great emphasis on and investment in processes and systems for codification. These typically involve the simplification of complex social and biophysical landscapes so that they are 'legible' (Scott 1998) for REDD+, resulting in a particular kind of knowledge politics. In settings where state tenure over forests was strong, and REDD+ was implemented through governments (e.g., in Asia and Africa), REDD+ codification tended to align with state territorialisation over forest lands. However, as our findings under the theme of dissonance show, greater state power vis-à-vis forests has ultimately proved ineffective at protecting forests in the face of market pressures, corruption, and other wider transitions. This is because the government-housed REDD+ agencies have typically been sidelined from higher-level planning and investment decisions.

Dissonance

Given the challenges associated with actor enrolment and the political effects of codification, outlined above, we considered whether REDD+ implementation showed signs of achieving its social and environmental goals, or whether there were gaps between these goals and emerging outcomes on the ground. Indeed, there was strong evidence of dissonance in our case studies, and in the wider literature. Four indicators illustrate the theme: social tension or conflict at the REDD+ site (D1); ongoing forest clearance in the target area (D2); problems with leakage (D3); and violation of new REDD+ boundaries (D4).

Evidence of dissonance in the form of social tensions and ongoing forest clearance was strongly evident at our case study sites, and in more than 90% of the reference cases that discussed local REDD+ outcomes (see D1 and D2). While we did not collect forest data ourselves, our observations of forest clearance in the Cambodian, Lao and Vietnamese field sites were affirmed in 2014 and 2016 global maps of forest cover change (Hansen et al. 2013). Ongoing and stronger implementation of REDD+ at the field sites may reverse this trend, but only time will tell. If the REDD+ projects do manage to curb forest loss, the issue of leakage or displacement of carbon emissions then arises, and is likely to be a significant issue due to mainland Southeast Asia's porous borders (Meyfroidt and Lambin 2009; Ingalls et al 2018). Leakage was not something we could attend to with site-based ethnography, and perhaps for this reason it was only discussed in seven of the reference cases. But where leakage was discussed, it was noted to be a problem in 57% of cases (D3).

In both the case studies and the reference cases, social tensions appeared to emerge when REDD+ intersected with historical tenure claims or contests, as well as ongoing demands for land. For example, in Laos, the REDD+ project built upon the state's Focal Site Strategy and Participatory Land Use Planning processes (Dressler et al. 2014). This meant that swidden activity was displaced from protected to production forest zones, resulting in overlapping land use and land claims by two different ethnic minorities. Scarcity of land in turn resulted in shortened fallow rotations and depleted soil fertility, while local desires for new land fuelled tensions among farmers with uneven access to land. Similarly in Vietnam, the REDD+ project sought to formalise community forest tenure through 'red books' (long-term land-use certificates), but this formalisation opportunity instead fed competition for agricultural land (To et al. 2017). In Cambodia, conflicts stemmed from the dynamic overlap between village lands, REDD+ zones, and Economic Land Concessions (Mahanty et al. 2015; Milne 2015). Although the specific causes of tension in the reference cases varied, they consistently arose from the interplay between REDD+ activities, existing land claims and conflicts, as well as struggles to access REDD+ benefits and/or land in the project area.

Similarly, forest clearance at REDD+ project sites often stemmed from the intersection of historical factors with ongoing political and economic processes. For example, in Laos, the project's agricultural co-benefit activities served to reinforce market intensification and land use pressures (Dressler et al. 2014). In Vietnam and Cambodia, demand for agricultural land to feed a regional cassava boom drove clearance at the REDD+ site (Mahanty and Milne 2016; To et al. 2016, 2017), which merged in the Cambodian case with land speculation fuelled by government titling initiatives and the threat of new Economic Land Concessions (Milne 2013, 2015). In the reference cases, similar failures of planning and regulation, combined with intense market pressure, were responsible for ongoing forest loss. The uncertain and tardy implementation of REDD+ has also played a role here, especially the failure of promised financial flows to materialise (Sills et al. 2014; Sunderlin et al. 2015). Nevertheless, the broader political economy of resource extraction, agricultural production, and land allocation is paramount in determining REDD+ outcomes, especially given ongoing doubts about the capacity of REDD+ payments to compensate for opportunity costs or incentivise behaviour change on the ground (Cacho et al. 2014).

Finally, the violation of newly demarcated boundaries (D4) reflects and corroborates our findings on social tension and ongoing forest clearance at REDD+ sites. This fourth indicator, present across our case studies, was also found in 71% of reference cases that discussed the problem of boundary enforcement. In our cases, new migrants and existing residents often violated REDD+ boundaries, for instance, to cultivate cash crops in Cambodia (Mahanty and Milne 2016) and Vietnam (To et al. 2017). The strongest presence of this indicator among reference cases was in Africa and Asia. This could be the corollary of state territorialisation in these regions as a result of REDD+, where greater state control in the face of local livelihood imperatives has fuelled disregard for demarcated boundaries. It could also reflect the problem of pervasive state ownership of forests, when there is limited state capacity to enforce boundaries. Both dynamics were observed in our case studies. Conflicts over land use and boundary violation were also present in Latin American cases, but these often pre-dated the REDD+ schemes and did not necessarily involve state actors.

DISCUSSION

Some analysts suggest that the main constraints to implementing REDD+ emerge from the need for stronger international commitments to climate change mitigation and more carbon finance (Sunderlin et al. 2015). The Paris Agreement is a step forward in overcoming these constraints, but REDD+ finance is still likely to fall short (Houghton et al. 2017). Even with sufficient financing and international commitment, however, we argue that attention must be given to the profound challenges that plague REDD+ in practice, as documented here. Beyond the immediate technical and practical problems of establishing clear tenure, robust monitoring, financial flows and appropriate safeguards (Sills et al. 2014), our results highlight that the more subtle and contested dynamics of REDD+ implementation could hinder or undermine progress. Regardless of how REDD+ evolves under emerging UNFCCC guidance, and with new finance, we argue that learning from the experiences of 'actually existing' REDD+ is vitally important. These experiences point to the way in which REDD+ implementation is necessarily path dependent and locally embedded. Herein, three key insights emerge.

Firstly, a suite of enrolment issues is present, meaning that those who need to be 'on board' for REDD+ to succeed remain only partially engaged, or indeed not targeted at all. International start-up funding and the promise of future revenues drove initial enrolment in REDD+. However, the failure of many site-based REDD+ projects to deliver local benefits has led to community frustration and scepticism. Arguably, this was the product of uncertainties in international REDD+ financing agreements and the weak carbon market (Sunderlin et al. 2015). But we show that substantial REDD+ funding *has* flowed—although it has been invested mainly in the development of REDD+ bureaucracies and national strategies, rather than in the rewarding of forest-users for changing their practices. The result has been weak enrolment of key actors on the ground at project sites, as well as only partial enrolment of state actors who are typically torn between carrying out REDD+ processes and submitting to the demands of elite decision-making about land and resources. These observations resonate with recent studies on REDD+ policy networks, which highlight the limited practical influence and reach of REDD+, and therefore its limited capacity to tackle the political-economic drivers of forest loss (Brockhaus and Di Gregorio 2014; Babon et al. 2014; Pham et al. 2014; Angelsen et al. 2017). Effectively, the potential for concrete local and national actions to stop deforestation has been diminished, even while international funding has continued to flow.

Secondly, the stringent and technical demands of compliance with international carbon standards have led to many REDD+ project activities being overly focused upon codification processes, such as classification, mapping, box-ticking and associated data collection, which ultimately distract from wider substantive issues. For example, the 'safeguard information systems' for REDD+, arising from the Cancun Agreements (COP16 2011), create a technical emphasis on indicators, methodologies and reporting frameworks for FPIC implementation, leading to a narrow project focus on evidence production to demonstrate compliance. But as our case studies show, such evidence can be produced even when FPIC processes fail to address the fundamental problems of knowledge translation and collective consent in communities targeted by REDD+. This shows how narrowly framed data production efforts have the capacity to mask local confusion and inequities around REDD+, as well as ongoing forest loss. The MRV and safeguard arrangements under the Paris Agreement and Cancun Agreement respectively, while well intended and essential to REDD+, risk falling into this trap. In essence, their technocratic emphasis on standardised REDD+ requirements could continue to divert substantive attention away from the underlying drivers of deforestation, leading to continued dissonance and under-achievement. This relatively understudied issue has important implications not only for the local impacts of REDD+, but it also raises questions about whether REDD+ represents an equitable and effective mitigation technology (see McDermott and Ituare-Lima 2016).

Thirdly, our findings highlight how REDD+ tenure interventions can strengthen and centralise state control over forests, especially in Asia and Africa. This raises the prospect of adverse outcomes for forests and livelihoods, as anticipated early on in REDD+ debates (Phelps et al. 2010), and as observed in other apparently 'decentralising' forest management efforts (Ribot et al. 2006). Only in settings with strong local or indigenous forest tenure, as in parts of Latin America, was this trend contained, notwithstanding the region's continuing challenges of clientelism and forest conflicts (Larson and Petkova 2011). One of the key risks of increased state authority, apart from weakened local resource rights, is that it does not necessarily help to achieve REDD+'s intended goal of reversing forest loss and degradation, as seen in the evidence for dissonance. Our findings therefore

highlight the potentially adverse consequences of state-driven REDD+ implementation, even if it nominally involves tenure interventions for local resource rights. This form of REDD+ provides no guarantee of emissions reductions, given potential issues with corruption, elite-backed resource grabbing, and new or exacerbated land conflicts.

CONCLUSION

This synthesis of ethnographic research adds to mounting evidence that REDD+ faces significant challenges in addressing the political and economic drivers of forest loss and degradation. Our comparative analysis of case studies and structured review of the wider literature have highlighted how dissonance in REDD+ implementation, including social conflicts and ongoing forest loss, results from *mismatches* in two key realms. The first realm relates to who is involved; here, problems with national and local enrolment mean that the very actors that REDD+ needs to influence are not fully engaged. The second realm relates to targeting; here, the systems of codification produced by REDD+ typically fail to 'see' the local complexities of forest use and land use change, even if evidence for the purposes of carbon accounting and compliance is produced. Thus, while REDD+ projects may succeed in performing technical and managerial tasks, the completion of these tasks does not necessarily deliver well-targeted or concrete actions to address forest loss.

Although much of the evidence for this analysis has come from site-level, voluntary market schemes, these early experiments set expectations and patterns that will shape future REDD+. Our development of robust analytical themes that draw from social science literature—enrolment, codification and dissonance—has allowed us to synthesise ethnographic findings and extend them to the wider REDD+ policy context. By highlighting these cross-cutting themes, only detectable through ethnographic methods, we characterise the subtler socio-political dynamics of intervention associated with REDD+, especially the inherent limitations of REDD+ as a technical tool for roll-out across the world's forest frontiers. Even if what we have witnessed has been incipient and partially implemented, our analysis of 'actually existing' REDD+ points to a long road of complicated and contingent outcomes ahead. In particular, the possibility for REDD+ to exacerbate social tensions or generate perverse or unintended outcomes must not be discounted, even if social and environmental safeguards are implemented. These findings should therefore inform any future approaches to REDD+ under the new UNFCCC commitments.

With 2018's renewed hopes that forest-based intervention can boost climate change mitigation, the problematic outcomes of REDD+ cannot be ignored. We contend that REDD+ needs to pay less attention to bureaucratic structures, and more attention to flexible, meaningful and grounded problem-solving that prioritises local benefit flows. Without this, REDD+'s potential as a climate change mitigation tool remains highly equivocal. Or worse still, REDD+ risks becoming an example of how elite-captured bureaucracies can produce systematic failure and distraction from the problems at hand. New research into REDD+ must now address the mechanism's proven capacity to misfire and mismatch, so that future action and spending can be properly targeted.

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Supplementary Table 1
Reference case studies

Reference (grouped by region)	Country	Keywords
Africa		
Westholm, L. and S. Arora-Jonsson. 2015. Defining solutions, finding problems: deforestation, gender, and REDD+in Burkina Faso. *Conservation & Society* 13 (2): 189-199.	Burkina Faso	Deforestation; gender; global governance; REDD+; World Bank; Burkina Faso
Awono, A., O.A. Somorin, R. Eba'a Atyi, and P. Levang. 2014. Tenure and participation in local REDD + projects: insights from southern Cameroon. *Environmental Science & Policy* 35: 76-86.	Cameroon	Tenure; participation; communities; livelihoods; REDD+; Cameroon
Dkamela, G. P., M. Brockhaus, F.K. Djiegni, J. Schure, and S.A. Mvondo. 2014. Lessons for REDD + from Cameroon 's past forestry law reform: a political economy analysis. *Ecology and Society* 19 (3): 30.	Cameroon	Cameroon; forestry law reform; policy networks; political economy analysis; REDD+policy process
Leach, M. and I. Scoones. 2013. Carbon forestry in West Africa: the politics of models, measures and verification processes. *Global Environmental Change* 23 (5): 957-967.	Ghana	Carbon; forest landscape politics; REDD+; measurement
Hashmiu, I. 2015. *Landscapes in Africa*. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 163-179. Oxon: Routledge.	Ghana	Carbon; forest landscape politics; REDD+;
Atela, J. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 108-123. Oxon: Routledge.	Kenya	Carbon; forest landscape politics; REDD+;
Atela, J. et al. 2016. Implementing REDD+ at the national level: stakeholder engagement and policy coherences between REDD+ rules and Kenya's sectoral policies. *Forest Policy and Economics* 65: 37-46.	Kenya	Agricultural mechanization; deforestation; policy interplay; resettlement; REDD+
Chomba, A.S., J. Kariuki, J.F. Lund, and F. Sinclair. 2016. Roots of inequity: how the implementation of REDD + reinforces past injustice. *Land Use Policy* 50: 202-213.	Kenya	REDD+; Kenya; benefit sharing; small-scale farmers; land tenure; equity
Kariuki, J. and R. Birner. 2016. Are market-based conservation schemes gender- blind? A qualitative study of three cases from Kenya. *Society & Natural Resources* 29 (4): 432-447.	Kenya	Gender; Kenya; payment for ecosystem services; reduced emissions from deforestation and forest degradation
Poudyal, M. et al. 2016. Can REDD+ social safeguards reach the 'right' people? Lessons from Madagascar. *Global Environmental Change* 37: 31-42.	Madagascar	Social impacts; equity protected areas; evaluation; swidden; tavy
Jindal, R., J.M. Kerr, and S. Carter. Reducing poverty through carbon forestry? Impacts of the N'hambita community carbon project in Mozambique. *World Development* 40 (10): 2123-2135.	Mozambique	Africa; Mozambique; PES; carbon; REDD+; impacts
Winnebah, T. and M. Leach. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 180-195 Oxon: Routledge.	Sierra Leone	Carbon; forest landscape politics; REDD+;
Beymer-Farris, B.A. and T.J. Bassett. 2012. The REDD menace: resurgent protectionism in Tanzania's mangrove forests. *Global Environmental Change* 22 (2): 332-341.	Tanzania	Environmental history; environmental justice; carbon forestry; REDD+; global climate change
Dyngeland, C., P. Vedeld, and A. Vatn. 2014. REDD+ at work? Implementing consistent REDD+ policies at local levels - a case from Kilosa District, Tanzania. *International Forestry Review* 16 (6): 549-562.	Tanzania	REDD+pilot schemes; policies and governance; livelihoods; Africa; Tanzania
Kijazi, M. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 58-78 Oxon: Routledge.	Tanzania	Carbon; forest landscape politics; REDD+;
Cavanagh, C. and T.A. Benjaminsen. 2014. Virtual nature, violent accumulation: the 'spectacular failure' of carbon offsetting at a Ugandan National Park. *Geoforum* 56: 55-65.	Uganda	Voluntary carbon markets; spectacle carbon offsets; virtualism; accumulation by dispossession; green grabbing
Nel, A. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 94-107 Oxon: Routledge.	Uganda	Carbon; forest landscape politics; REDD+;
Kamelarczyk, K.B.F. and C. Smith-Hall. 2014. REDD herring: Epistemic community control of the production, circulation and application of deforestation knowledge in Zambia. *Forest Policy and Economics* 46: 19-29.	Zambia	Environmental science; environmental policy; environmental knowledge; forests; REDD+
Mickels-Kokwe, G. and L. Mangwanya. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 124-141 Oxon: Routledge.	Zambia	Carbon; forest landscape politics; REDD+;
Benjaminsen, G. 2014. Between resistance and consent: project-village relationships when introducing REDD+ in Zanzibar. *Forum for Development Studies* 41 (3):, 377-398 (2014).	Zanzibar	Project-village relationships; resistance; consent; REDD+; Zanzibar
Dzingirai, V. and L. Mangwanya. 2015. Landscapes in Africa. In: *Carbon Conflicts and Forest* (eds. Leach, M. and I. Scoones) Pp. 142-162 City: Routledge.	Zimbabwe	Carbon; forest landscape politics; REDD+;
Asia/Pacific		
Pasgaard, M. and L. Chea. 2013. Double inequity? The social dimensions of deforestation and forest protection in local communities in northern Cambodia. Current Research on *South-East Asia/Aktuelle Südostasienforschung* 6 (2): 330-355.	Cambodia	Cambodia; community forestry; deforestation; equity; social assessment

Supplementary Table 1
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Vijge, M.J. and A. Gupta. 2014. Framing REDD+ in India: carbonizing and centralizing Indian forest governance? *Environmental Science & Policy* 38: 17-27.	India	REDD+; forest governance; India; climate policy; carbonization; green; India; mission
Resosudarmo, I.A.P. et al. 2014. Does tenure security lead to REDD+project effectiveness? Reflections from five emerging sites in Indonesia. *World Development* 55: 68-83.	Indonesia	*de jure* and *de facto* tenure; interest; REDD+ effectiveness; forest; Indonesia; emissions
McGregor, A. et al. 2015. Beyond carbon, more than forest? REDD+governmentality in Indonesia. *Environment and Planning A* 47 (1): 138-155.	Indonesia	Governmentality; environmentality; REDD+; forest governance; environmental justice; Indonesia
Galudra, G., M. van Noordwijk, P. Agung, S. Suyanto, and U. Pradhan. 2014. Migrants, land markets and carbon emissions in Jambi, Indonesia: land tenure change and the prospect of emission reduction. *Mitigation and Adaptation Strategies for Global Change* 19 (6): 715-731.	Indonesia	Conflict; customary rights; deforestation; FPIC; NAMA; power relations; REDD+ ; tenure; security
Mulyani, M. and P. Jepson. 2015. Social learning through a REDD+ 'village agreement': Insights from the KFCP in Indonesia. *Asia Pacific Viewpoint* 56 (1):, 79-95.	Indonesia	Indonesia; KFCP; participation; REDD+; social learning; village agreement
Eilenberg, M. 2015. Shades of green and REDD: local and global contestations over the value of forest versus plantation development on the Indonesian forest frontier. *Asia Pacific Viewpoint* 56 (1): 48-61.	Indonesia	Conservation; forest frontiers; Indonesia; land enclosures; palm oil; REDD+
Lounela, A. 2015. Climate change disputes and justice in Central Kalimantan, Indonesia. *Asia Pacific Viewpoint*. 56 (1): 62-78.	Indonesia	Dispute; forest; justice; justification; NGO; REDD+
Astuti, R. and A. McGregor. 2015. Governing carbon, transforming forest politics: a case study of Indonesia's REDD+ Task Force. *Asia Pacific Viewpoint* 56 (1): 21-36.	Indonesia	Carbon rationalities; forest carbon; forest politics; governmentality; Indonesia; REDD+governance
Howson, P. and S. Kindon. 2015. Analysing access to the local REDD+benefits of Sungai Lamandau, Central Kalimantan, Indonesia. *Asia Pacific Viewpoint* 56 (1): 96-110.	Indonesia	Access; agency; benefit sharing; forest carbon finance; Indonesia; REDD+
Baird, I.G. 2014. Reduced emissions from deforestation and forest degradation (REDD) and access and exclusion: obstacles and opportunities in Cambodia and Laos. *Southeast Asian Studies* 3 (3): 643-668.	Laos	Land tenure; common property; land-use management; carbon; forestry; ecosystem services
Dwyer, M.B., M.L. Ingalls, and I.G. Baird. 2015. The security exception: development and militarization in Laos's protected areas. *Geoforum* 69:207-217.	Laos	Protected areas; security exception; militarization; border landscapes; REDD+; Laos
Vongvisouka, T, R. Brandt Broegaardb, O. Mertzb, and S. Thongmanivonga. 2016. Rush for cash crops and forest protection: neither land sparing nor land sharing. *Land Use Policy* 55: 182-192.	Laos	Cash crops; land-use change; Laos; policy; REDD+; shifting cultivation
Ingalls, M.L. and M.B. Dwyer. 2016. Missing the forest for the trees? Navigating the trade-offs between mitigation and adaptation under REDD. *Climatic Change* 136 (2): 353-366.	Laos	Carbon; forest landscape politics; REDD+;
Ojha, H.R., D. Khatri, K.K. Shrestha, B. Bushley, and N. Sharma. 2013. Carbon, community and governance: is Nepal getting ready for REDD+? *Forests, Trees and Livelihoods* 22 (4): 216-229.	Nepal	Carbon trade; REDD; community forestry; Nepal; governance
Bastakoti, R.R. and C. Davidsen. 2014. REDD+ and forest tenure security: concerns in Nepal's community forestry. *International Journal of Sustainable Development & World Ecology* 21 (2): 168-180.	Nepal	Carbon trade; community forestry; livelihoods; Nepal; REDD+; tenure rights
Poudel, D.P. 2014. REDD+ comes with money, not with development: an analysis of post-pilot project scenarios from the community forestry of Nepal Himalaya. *International Journal of Sustainable Development & World Ecology* 21 (2): 552-562.	Nepal	Community forestry; Nepal Himalaya; post-REDD+pilot project; constraints scenario; legal puzzle
Saito-Jensen, M., R.L. Rutt, and B.B.K. Chhetri. 2014. Social and environmental tensions: affirmative measures under REDD+carbon payment initiatives in Nepal. *Human Ecology* 42 (5): 683-694.	Nepal	REDD+; payment for environmental services; equity; benefit distribution; Nepal
Sikor, T. and H. Cam. 2016. REDD+ on the rocks? Conflict over forest and politics of justice in Vietnam. *Human Ecology* 44 (2): 217-227.	Vietnam	Forest; justice; politics; reduced emissions from deforestation and forest degradation; Vietnam
Americas		
Kongsager, R. and E. Corbera. 2015. Linking mitigation and adaptation in carbon forestry projects: evidence from Belize. *World Development* 76: 132-146.	Belize	Climate change; REDD+; validation; additionality; livelihood; development
West, T.A.P. 2016. Indigenous community benefits from a de-centralized approach to REDD+ in Brazil. *Climate Policy* 16 (7): 924-939.	Brazil	Climate policy framework; community participation; decentralized governance; equity; NGOs; REDD+
Loaiza, T., U. Nehren, and G. Gerold. 2015. REDD+ and incentives: an analysis of income generation in forest-dependent communities of the Yasuní Biosphere Reserve, Ecuador. *Applied Geography* 62:225-236.	Ecuador	Yasuní; Ecuador; Amazon; income generation; forest dependency; REDD+

Supplementary Table 1

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Loaiza, T, U. Nehren, and G. Gerold. 2016. REDD+ implementation in the Ecuadorian Amazon: why land configuration and common-pool resources management matter. Forest Policy and Economics 70: 67-79.	Ecuador	CPMRs; Yasuní; Amazon Indigenous peoples; REDD +; forest governance
Krause, T. and T.D. Nielsen. 2014. The legitimacy of incentive-based conservation and a critical account of social safeguards. *Environmental Science & Policy* 41: 44-51.	Ecuador	Global environmental governance; legitimacy; local stakeholder; Ecuador; Socio Bosque program; REDD+
Skutsch, M. et al. 2015. Opportunities, constraints and perceptions of rural communities regarding their potential to contribute to forest landscape transitions under REDD+: case studies from Mexico. *International Forestry Review* 17 (1): 65-84.	Mexico	Forest degradation; Payment for Ecosystem Services (PES); community forest management; benefit sharing
Osborne, T.M. 2011. Carbon forestry and agrarian change: access and land control in a Mexican rainforest. *The Journal of Peasant Studies* 38 (4): 859-883.	Mexico	Carbon forestry; carbon market; environmental enclosure; agrarian question; Chiapas; Mexico
Osborne. T. 2015. Tradeoffs in carbon commodification: a political ecology of common property forest governance. *Geoforum* 67: 64-77.	Mexico	Carbon market; carbon offsets; forest governance; REDD+; commodification of nature; political ecology; Mexico
Hendrickson, C.Y. and E. Corbera. Participation dynamics and institutional change in the Scolel Té carbon forestry project, Chiapas, Mexico. *Geoforum* 59: 63-72.	Mexico	Carbon; forests; payments; property; participation; Mexico
Pacific		
Dalsgaard, S. and M. Pedersen. 2015. The portable sawmill and other challenges to REDD+in Papua New Guinea. *Asia Pacific Viewpoint* 56 (1): 128-139.	Papua New Guinea	Carbon trading; conservation; Papua New Guinea; REDD+; technology
Filer, C. and M. Wood. 2012. The creation and dissolution of private property in forest carbon: a case study from Papua New Guinea. *Human Ecology* 40 (5): 665-677.	Papua New Guinea	Papua New Guinea ; forest policy; carbon trade; property rights
Leggett, M. and H. Lovell. 2012. Community perceptions of REDD+: a case study from Papua New Guinea. *Climate Policy* 12 (1): 115-134.	Papua New Guinea	Avoided deforestation; community participation; forest communities; land tenure; Papua New Guinea; REDD+; usage rights
Filer, C. 2012. Why green grabs don't work in Papua New Guinea. *The Journal of Peasant Studies* 39 (2): 599-617.	Papua New Guinea	Papua New Guinea; land tenure; forestry; agriculture; conservation

Supplementary Table 2

List of indicators and their prevalence in reference cases

Theme	Indicator	No. cases indicator discussed	No. cases indicator present
Enrolment	Externally financed national REDD + strategy	35	32
	Stakeholder consultation process, including FPIC	37	33
	Promise of financial benefits to local actors	43	42
	Delivery of financial benefits to local actors discussed	34	NA
	Financial benefits delivered to local actors	34	15
	Financial benefits not delivered to local actors (E2)	**34**	**19**
	Co-benefits discussed	29	NA
	Co-benefits promised to local actors	29	27
	Co-benefits delivered to local actors	29	9
	Local views discussed (positive, negative, confused, neutral)	33	NA
	Positive local views on REDD+	33	2
	Neutral local views on REDD +	33	13
	Local confusion or lack of awareness of REDD + (E1)	**33**	**18**
	Negative local views of REDD+ (E3)	**33**	**14**
Codification	MRV systems discussed	32	NA
	Implementation of MRV systems (C1)	**32**	**19**
	Local engagement in MRV	32	15
	Difficulties in implementing MRV e.g., across scales	32	12
	REDD + and tenure interventions discussed	40	NA
	State property demarcation as part of REDD+ (C4)	**38**	**14**
	Indigenous land title supported as part of REDD+	31	4
	Private land titles supported as part of REDD+	32	8
	New boundaries demarcated as part of REDD+ (C2)	**40**	**28**
	REDD+influence on local tenure arrangements (C3)	**40**	**22**

Supplementary Table 2
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Dissonance	Problems with additionality	6	5
	Social tension and conflict due to REDD+ (D1)	**39**	**36**
	Ongoing forest clearance in the target area (D2)	**34**	**31**
	Problems with leakage (D3)	**7**	**4**
	Violation of new REDD + boundaries (D4)	**28**	**20**
Features of the REDD + case	REDD+project type discussed (private, demonstration etc.)	53	NA
	Part of a voluntary certification scheme, e.g., VCS	53	18
	Considered to be a national REDD + demonstration site	53	38
	Restrictions on shifting agriculture	22	16
	Restrictions on subsistence livelihood activities	31	25
	Support for intensification of shifting agriculture	25	15
	Support for new market-oriented livelihood activities	30	23
	Resettlement of local communities	21	7
	Local tenure arrangements discussed	47	NA
	Presence of state tenure at the project site	43	32
	Presence of private tenure at the project site	35	21
	Presence of indigenous lands at the project site	41	21
	Presence of community forestry at the project site	43	22