World Development 185 (2025) 106803

Contents lists available at ScienceDirect

World Development

journal homepage: www.elsevier.com/locate/worlddev

Regular Research Article

Challenges for implementing zero deforestation commitments in a highly forested country: Perspectives from Liberia's palm oil sector

Joss Lyons-White [a,*], Philip A. Zodua [b], Christian Mikolo Yobo [c], Solomon C. Carlon [d], Robert M. Ewers [a], Andrew T. Knight [a,e]

[a] Georgina Mace Centre for the Living Planet, Department of Life Sciences, Imperial College London, Silwood Park Campus, Ascot SL5 7PY, United Kingdom
[b] Save My Future (SAMFU) Foundation, Jangaba Avenue ELWA, Paynesville, Montserrado, Liberia
[c] Département d'Ecosystème Terrestre de l'Institut de Recherche en Ecologie Tropicale du Centre National de Recherche Scientifique et Technologique (IRET/CENAREST), BP: 1334 5 Libreville, Gabon
[d] Conservation International Liberia, Apt. 301 & 302, Embassy Compound, 13th Street, Beach Side, Sinkor, Monrovia, Liberia
[e] BioCultural Futures, School of Molecular and Life Sciences, Curtin University, Kent Street, Bentley, Western Australia 6102, Australia

ARTICLE INFO

Keywords:
Conservation
Palm oil
Poverty alleviation
Supply chains
Systems thinking

ABSTRACT

Halting deforestation is essential to address climate change and biodiversity loss. However, in highly forested, low-income countries like Liberia, "zero deforestation" commitments (ZDCs) adopted by companies may restrict agricultural expansion that has been promoted in national strategies to alleviate poverty. In such situations, examining contrasting perspectives among stakeholders is important to inform ZDCs' implementation. Here, we applied Critical Systems Heuristics in 94 interviews to explore stakeholders' perspectives on, and thereby develop a systematic understanding of, ZDCs in Liberia's concession-based palm oil sector. We found that regulatory, institutional, and political factors that were needed to support commitments' implementation were missing. Concessions had initially been allocated without communities' consent being adequately obtained, and oil palm expansion had subsequently been stalled by zero deforestation. This produced a situation where communities that lost farmland to oil palm were reluctant to allow further expansion, while communities in forest areas were frustrated by a lack of promised oil palm expansion. Consequently, although limited oil palm expansion suggests ZDCs were effective after they were adopted, this was perceived to have come at the expense of anticipated improvements in community welfare, with community members in highly forested areas feeling deprived of development. We argue that neither the complete development of Liberia's oil palm concessions nor limited development with zero deforestation will necessarily improve communities' welfare without reforming the concession system to promote community-led, deforestation-free agricultural development. This requires public governance reforms, novel mechanisms for agricultural investment, and the localisation of international standards to facilitate zero deforestation in smallholder agriculture.

1. Introduction

Tropical deforestation is a global problem associated with climate change (Baccini et al., 2017; van der Werf et al., 2009), biodiversity loss (Alroy, 2017; Gibson et al., 2013; Watson et al., 2018) and the emergence of diseases (Dobson et al., 2020; Faust et al., 2018; Gregory et al., 2022). It is also associated with the marginalisation and repression of forest peoples (Butt et al., 2019; Ferrante et al., 2020; Finer et al., 2008). Over a quarter of tropical deforestation can be attributed to international demand for agricultural and forestry commodities including beef, palm oil, timber products, and soybeans (Pendrill et al., 2019). However, some of these so-called "forest-risk commodities" also support economic development and rural livelihoods (Krishna et al., 2017). In the case of palm oil, this has produced intense debates over its economic benefits versus environmental and social impacts (Li, 2024; Meijaard & Sheil, 2019).

Throughout the 2010s, dozens of multinational corporations committed to achieving "zero deforestation" in supply chains for forest-risk commodities (Garrett et al., 2019; Lambin et al., 2018). In the palm oil sector, zero deforestation commitments (ZDCs) are often

* Corresponding author at: Conservation and Development Lab (CDL), Department of Geography, University of Cambridge, Downing Place, Cambridge CB2 3EN, United Kingdom.
E-mail address: joss.lyons.white@gmail.com (J. Lyons-White).

https://doi.org/10.1016/j.worlddev.2024.106803
Accepted 2 October 2024
Available online 23 October 2024

implemented using certification by the Roundtable on Sustainable Palm Oil (RSPO; Bager & Lambin, 2022; Lyons-White & Knight, 2018). Since 2018, the RSPO has mandated zero deforestation by requiring certified companies to apply the High Carbon Stock Approach (HCSA; Rosoman et al., 2017). The HCSA enables plantation developers to distinguish High Carbon Stock (HCS) forests from non-forest land that can be used for oil palm by making a qualitative assessment of vegetation structure. Any areas classified as Young Regenerating Forest or Low, Medium, or High Density Forest must be conserved (Rosoman et al., 2017). By applying the HCSA methodology, companies should in theory avoid deforestation when developing oil palm plantations.

Forest-focused supply chain initiatives like ZDCs do not necessarily produce effective and equitable outcomes simultaneously for conservation and human development (Grabs et al., 2021). ZDCs may clash with national economic development goals based on agricultural expansion (Lyons-White et al., 2020) or they may exclude vulnerable smallholder farmers from supply chains (Grabs et al., 2021). Tools for implementing ZDCs can also conflict with local communities' needs (Cheyns et al., 2019). For example, early versions of the HCSA restricted communities' access to forests, impairing their livelihoods and food security (Colchester & Anderson, 2015; Colchester et al., 2014). The HCSA Toolkit now includes detailed social requirements for companies, which include assisting communities in proposed development areas to secure land tenure, excising unceded community lands from concessions, conducting participatory mapping, and observing the principles of Free, Prior, and Informed Consent (FPIC; Rosoman et al., 2017). Increasingly, research is examining how requirements like these could improve the equity of ZDCs (Grabs et al., 2021), as well as analysing potential trade-offs between equity and effectiveness (Cammelli et al., 2022; Garrett, Levy, et al., 2021; Grabs & Garrett, 2023; Lee et al., 2020).

The equity of ZDCs can be understood in at least three dimensions (Grabs et al., 2021; McDermott et al., 2013). *Contextual equity* relates to recognition of the "uneven playing field" of pre-existing political, economic, and social conditions that influence access to decision-making and resources (McDermott et al., 2013). *Procedural equity* relates to fairness in decision-making and may involve participation by marginalised groups. *Distributive equity* refers to the sharing of costs, benefits, and risks between actors. Specifically in relation to ZDCs, a fourth dimension, *access equity*, has also been proposed. Access equity concerns the "opportunity of different groups of commodity producers, particularly those with high and low adaptive capacities, to participate in a ZDC supply chain" (Grabs et al., 2021, p.2).

The social equity and environmental effectiveness of forest-focused supply chain policies are important considerations in highly forested countries (>60% forest cover) and landscapes (>80% forest cover), where agriculture may be promoted to reduce poverty and limited non-forest land may be available for agricultural expansion (Austin et al., 2017; Lyons-White et al., 2020; RSPO, 2018). In Gabon, which has 88% forest cover (Sannier et al., 2014), some actors have challenged the legitimacy of ZDCs implemented using the HCSA, arguing that the HCSA is inappropriate for highly forested landscapes unless it is adapted by narrowing the criteria used to identify vegetated areas as forest (Lyons-White et al., 2022). However, the HCSA Steering Group (2018) has ruled out adapting the HCSA, deeming it incompatible with no deforestation.

The Republic of Liberia in West Africa is another highly forested country where ZDCs have encountered challenges with implementation. Liberia has at least 69% forest cover and accounts for 43% of the remaining Upper Guinean Forest (Republic of Liberia, 2021). Forest conservation is thus a national and international priority, and Liberia's National Forestry Reform Law (2006) established a target to protect 30% of the country's forest area. Although deforestation rates are low, forest fragmentation and degradation affected 27% of Liberia's primary and dense forests between 2000 and 2018 (de Sousa et al., 2023). Shifting agriculture was the leading driver of deforestation between 2005 and 2014, accounting for 141,093 ha of tree cover loss; other drivers of deforestation and degradation include selective and informal logging, mining, and charcoal production (Goslee et al., 2016). Oil palm expansion has been projected to produce 160,000–352,000 ha of deforestation between 2016 and 2030 (Goslee et al., 2016).

Although Liberia is rich in forest cover, it is a low-income country. Liberia's Human Development Index ranks 177th of 193 countries (UNDP, 2024) and over 50% of its population lives in poverty (World Bank, 2021b). The need for economic development is urgent and Liberia's government has prioritised agriculture in its poverty alleviation strategies (Republic of Liberia, 2008b, 2009, 2018b). Between 2008 and 2011, the government awarded over 620,000 ha of oil palm concessions to four multi-national companies, expanding the rentier sector of Liberia's economy to raise state revenues for poverty alleviation (Atkinson, 2015; Werker & Pritchett, 2017). These companies included Sime Darby, an RSPO member which committed to zero deforestation in 2014 and implemented a moratorium on plantation development that year pending an HCS assessment (Sime Darby Plantation, 2014b). In 2020, Sime Darby divested from Liberia citing operating challenges including "land encumbrances" that led it to plant just 10,300 ha of its 220,000 ha concession (Sime Darby Plantation, 2019). This ended the company's commitment to invest US$3.1 billion and provide 35,000 jobs by 2030 (Sime Darby, 2011). Observers linked the divestment to the recognition of customary land rights and "stricter environmental standards" (Chu & Boyle, 2020), including the presence of high-density forest in 45% of Sime Darby's concession (Chain Reaction Research, 2019).

A systematic empirical understanding of the situation surrounding the implementation of ZDCs in Liberia's oil palm sector could inform more effective and equitable forest-focused supply chain initiatives in highly forested countries. In addition to considering the interplay between effectiveness and equity, engaging with diverse perspectives is essential to ensure conservation interventions meet the needs and secure the support of different actors in a landscape (Lyons-White et al., 2022; van Heist et al., 2015). Studying actors' perspectives in different highly forested countries is important because these countries differ in key respects including forest cover, poverty alleviation needs, and the economic importance of agriculture (World Bank, 2021a, 2021b). Liberia's case is noteworthy for its low economic development and high international conservation priority.

We applied Critical Systems Heuristics, a systems thinking methodology, to develop a systematic understanding of stakeholders' perspectives on ZDCs in Liberia's palm oil sector. Critical Systems Heuristics can assist with developing a holistic understanding of complex problematic situations and identifying leverage points for improvement through a structured "unfolding" of multiple perspectives (Ulrich and Reynolds, 2020). It also attends to the values, power structures, and moral basis on which actors might be expected to bear the consequences of policies. Critical Systems Heuristics therefore offered an ideal approach to examine ZDCs in Liberia's palm oil sector. We aimed to develop a holistic understanding of Liberia's situation and identify leverage points for improvement while considering multidimensional equity as characterised by McDermott et al. (2013). This could inform more effective and equitable implementation of ZDCs in highly forested, low development countries.

2. Study sites, methodological framework, and methods

2.1. Study sites

Liberia is defined as a high forest cover country by the RSPO (2018) and three of its four major oil palm concessions were awarded to RSPO members (Table 1). Alongside allocating areas for oil palm planting, concession agreements required concessionaires to develop "outgrower programmes". These would involve establishing contracts with smallholder farmers to support them to grow oil palm and supply concessionaires' mills. However, the establishment of outgrower schemes was

Table 1
Features of the four concessions in Liberia awarded to palm oil companies between 2008 and 2011.

Concession holder	LIBINC[1,2,3]	Golden Veroleum Liberia[4]	Maryland Oil Palm Plantation[5]	Sime Darby Plantation Liberia[6,7]‡
Parent company	Equatorial Palm Oil / Kuala Lumpur Kepong Berhad (KLK)*	Golden Agri Resources	SIFCA Group	Sime Darby Plantation
RSPO member[8]	Yes	Yes	No[9]	Yes
Concession agreement year	2008	2010	2011	2009
Developable concession area	~24,078 ha**	220,000 ha***	8,800 ha	220,000 ha***
Planned outgrower programme area	~10,117 ha**	40,000 ha	6,400 ha	44,000 ha
Projected employment (if known)	–	40,000[10]	–	35,000[11]
ZDC adopted by year†	2017[12]	2011[13]	2016[14]	2014[15]
Moratorium on clearing for new development (if known)[10]	2015[10]	–	–	2014[16]
Planted oil palm area in 2019	7,888 ha	18,800 ha	6,638 ha	10,263 ha
Notes	Equatorial Palm Oil divested to KLK, 2020[2]	–	–	Divested to Mano Palm Oil Industries, 2020[7]

* LIBINC and its holding company, Liberian Palm Developments Limited, were held by Equatorial Palm Oil until 2013 when KLK acquired a 50% share.[2,3] Equatorial Palm Oil divested its remaining 50% share to KLK in 2020. ** 34,500 acres from a pre-existing concession plus 25,000 acres for expansion and 25,000 acres for an outgrower scheme.[1] *** Total concession areas were 350,000 ha for Golden Veroleum Liberia and 311,187 ha for Sime Darby, of which 220,000 ha of each could be planted.[4,6] † Shows the earliest year in which evidence could be found that a ZDC had been adopted, although a ZDC may have been adopted earlier. ‡ Sime Darby Plantation Liberia was divested entirely to Mano Palm Oil Industries Ltd in 2020.[7]
References: 1. Republic of Liberia (2008a); 2. Equatorial Palm Oil (2020); 3. Kuala Lumpur Kepong Berhad (2013); 4. Republic of Liberia (2010); 5. Republic of Liberia (2011); 6. Republic of Liberia (2009); 7. Sime Darby Plantation (2019); 8. RSPO (2024); 9. ZSL (2024); 10. Atkinson (2015); 11. Sime Darby (2011); 12. Equatorial Palm Oil, 2017; 13. Golden Agri Resources (2011); 14. SIFCA (2016); 15. Sime Darby Plantation (2014b); 16. Sime Darby Plantation (2014a).

hindered by high costs of finance and government failures to deliver funding (National Oil Palm Platform of Liberia, 2021). To the authors' knowledge, no outgrower schemes have yet been launched.

Our study sites were Monrovia, Liberia's administrative capital, and communities located in and around four blocks of the former Sime Darby (now Mano Palm Oil Industries) concession in Grand Cape Mount and Bomi counties in Northwest Liberia (Fig. 1). This concession was selected as a focal site for our study due to Sime Darby's adoption of a ZDC and moratorium on land clearing in 2014, and its subsequent divestment from Liberia (Sime Darby Plantation, 2014a). Some communities in the study area had become organised into one of four "Multi-Stakeholder Platforms": organisations established to promote citizen engagement in concession management (Momoh & Browne, 2019). While some Multi-Stakeholder Platforms were initially self-organised, others were later established by the Government of Liberia to mitigate conflict and develop alternative livelihood opportunities. The four Multi-Stakeholder Platforms in the Sime Darby concession were the Project Affected Communities and Zodua Land Management Committee in Grand Cape Mount, and Senjeh Action for Peace and Development and the Gorbla Land Committee in Bomi (further details in Table 2 and **Supplementary Information**).

In 2013, Sime Darby signed a Memorandum of Understanding with the Zodua Land Management Committee to develop 6,900 ha of oil palm (Sime Darby Plantation, 2019). Zodua had 83% forest cover in 2014 (Kuepper et al., 2017) and oil palm development was suspended that year, following little expansion, due to Sime Darby's ZDC (Sime Darby Plantation, 2014b). In 2018, Sime Darby engaged with the Good Growth Partnership, a consortium of organisations led by the United Nations Development Programme (UNDP), to review its concession and inform sustainable development and conservation across the landscape (UNDP, 2018). The Zodua Land Management Committee signed a one-year renewable Conservation Agreement with the Good Growth Partnership in 2019 to sustainably manage 20,000 ha of community forest and conserve 5000 ha of High Conservation Value (HCV) areas. In return, the communities received agricultural extension services, livestock, scholarships, and renovation of the community health clinic (UNDP, 2019). The Conservation Agreement benefitted 632 households and 2800 community members (UNDP, 2021).

2.2. Methodological framework

Our methodological framework combined Critical Systems Heuristics (Ulrich, 1983) with the multidimensional equity framework developed by McDermott et al. (2013). Critical Systems Heuristics is designed for exploring stakeholders' contrasting perspectives on problematic situations (Ulrich & Reynolds, 2020). It promotes a holistic understanding of situations as systems and enables the identification of leverage points for change. "Stakeholders" are actors involved with or affected by a system. They can play one of four social roles: beneficiaries, decision makers, experts, or affected actors or their representatives. When affected stakeholders have limited opportunities to engage with the values, power, expertise, and moral dilemmas associated with a system, they can become "marginalised". Critical Systems Heuristics has a particular focus on examining stakeholder marginalisation. It promotes reflection on problematic situations to identify options for improvement, especially those that can emancipate marginalised stakeholders (Ulrich & Reynolds, 2020).

In practice, Critical Systems Heuristics works by providing a framework to explore stakeholders' contrasting judgements about what things are, or ought to be, relevant to a given system. These judgments, called "boundary judgments", are explored using 12 questions ("boundary questions"; Table 3). Each question can be asked in two modes: what *is* the case, and what *ought* to be the case? Responses to the boundary questions (and, hence, participants' perspectives) can then be critically assessed in a process called "boundary critique". Critical Systems Heuristics was designed for use in professional practice and action research (Ulrich & Reynolds, 2020) but it can also be used in applied research settings (e.g., Hutcheson et al., 2023). We considered its use appropriate here for three reasons. First, systems thinking can support a systematic understanding of complex conservation situations (Knight et al., 2019). Second, the research objective was to explore contrasting perspectives and develop a holistic understanding of the problematic situation (Ulrich & Reynolds, 2020). Third, Critical Systems Heuristics is designed to explore the marginalisation of stakeholders and perspectives, which can arise from ZDCs' implementation in highly forested countries (Lyons-White et al., 2020).

We applied Critical Systems Heuristics to develop a "reference system": an understanding of the problem situation based on an exploration of stakeholders' contrasting perspectives (Ulrich & Reynolds, 2020). Once the reference system was developed, we applied the

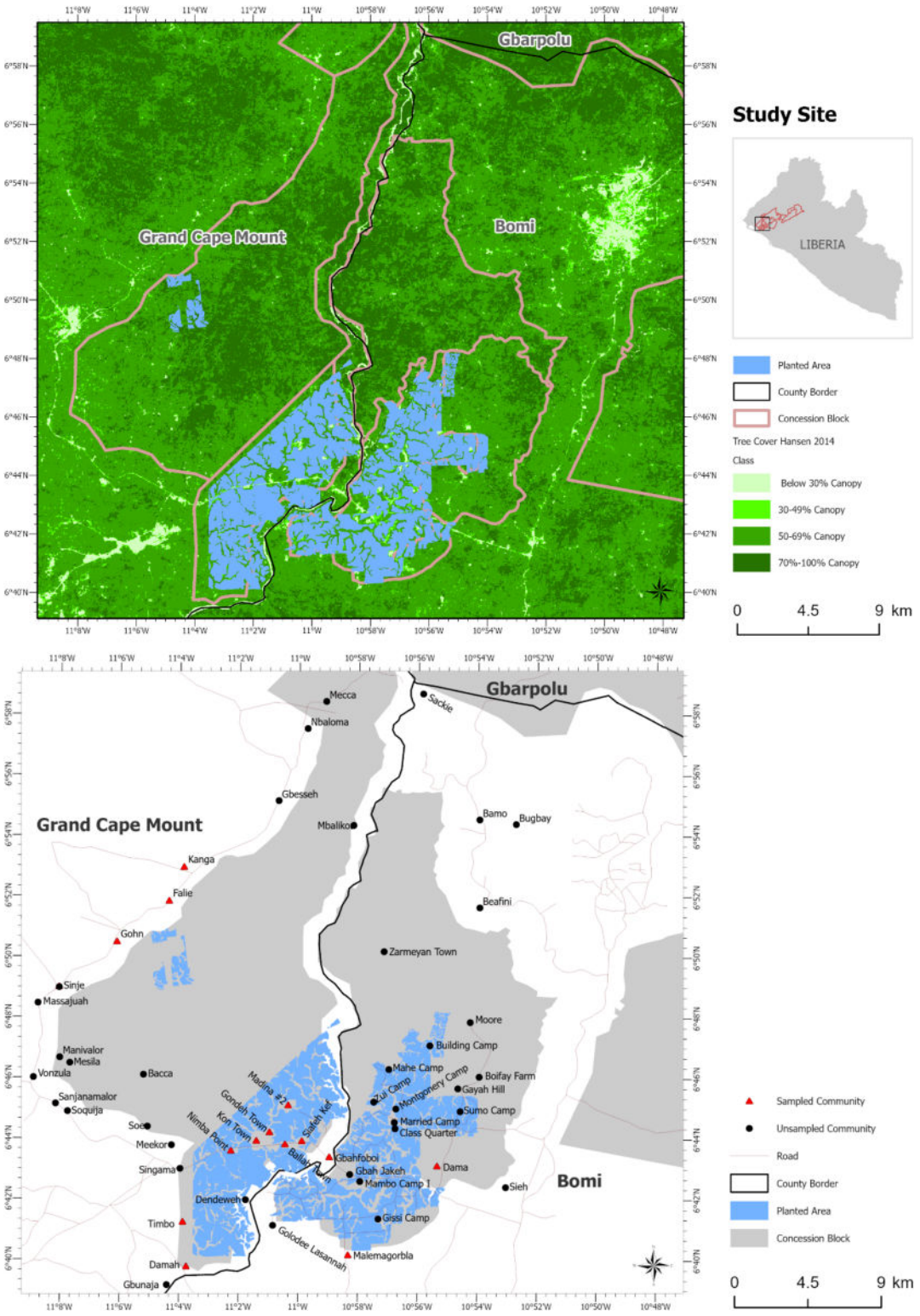

Fig. 1. Maps showing the focal study area around four blocks of the former Sime Darby oil palm concession in Northwest Liberia. Planted oil palm area is shown in blue. Top panel: Tree cover in the study area in 2014 when a land clearing moratorium was implemented by Sime Darby (Hansen et al., 2013). Areas with ≥30% canopy cover satisfy Liberia's national forest definition (Republic of Liberia, 2021). Areas with ≥50% canopy cover satisfy definitions of dense forest used in recent analyses of Liberian forest cover (de Sousa et al., 2023). Areas with ≥70% canopy cover indicate high density forest. Bottom panel: Sampled communities around the Sime Darby concession. All sampled communities are shown. There are a large number of unsampled communities in the study area, including members and non-members of the Multi-Stakeholder Platforms, but GPS data for these communities are incomplete. To provide an indication of the distribution of unsampled communities around the concession, those for which GPS data are available are shown. Communities in Multi-Stakeholder Platforms are described in Supplementary Information. Planted oil palm area used with permission from Conservation International Liberia. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 2
Key features of the four Multi-Stakeholder Platforms around the Sime Darby concession that represented communities included in this study (more details in Supplementary Information).

Multi-Stakeholder Platforms in or around Sime Darby concession	Project Affected Communities	Zodua Land Management Committee	Senjeh Action for Peace and Development	Gorbla Land Committee
County	Grand Cape Mount	Grand Cape Mount	Bomi	Bomi
N communities	17	3	7	14
Status[1]	Recognised by Government of Liberia	Recognised by Government of Liberia	Recognised by Government of Liberia	Not recognised by Government of Liberia
Key engagements with concessionaire	Communities raised complaint with RSPO in 2011 over 2,868 ha oil palm expansion in the Matambo estate.[2,3] Complaint was withdrawn after engagement with communities, revision of FPIC procedures, and provision of technical assistance to 453 farmers.	Signed Memorandum of Understanding with Sime Darby in 2013 to develop 6,900 ha oil palm.[3] Development halted after ~ 365 ha planted. No further planting took place. Conservation Agreement signed in 2019, benefitting 632 households.	Compensation paid to 199 farmers in 2014 for crops lost to earlier oil palm expansion.[4] Signed Memorandum of Agreement with Sime Darby in 2015 for further oil palm expansion.[3] No further planting took place.[2,3]	The impacts of concession operations (1,996 ha oil palm in Lofa estate[5]) on community land were allegedly disputed between communities and concessionaire.[6] Multi-Stakeholder Platform self-organised by community.

References: 1. Momoh & Browne (2019); 2. Sime Darby Plantation (2014b); 3. Sime Darby Plantation (2019); 4. Sime Darby Plantation (2016); 5. Sime Darby Plantation (2014a); 6. Interview, Gorbla Land Committee community.

Table 3
Critical System Heuristics "boundary questions", grouped by four dimensions ("sources of influence") of a problematic situation. The questions refer to a problematic situation conceived as a "system": a collection of interrelated entities perceived by an observer as acting together to achieve a purpose.

Sources of Influence	Boundary Judgements
Sources of Motivation	***1. Beneficiary:*** Who is, or ought to be, the beneficiary of the system?
	2. Purpose: What is, or ought to be, the purpose of the system?
	3. Measure of improvement: What is, or ought to be, the measure of success of the system?
Sources of Control	***4. Decision maker:*** Who is, or ought to be, the decision maker for the system?
	5. Resources: What resources are, or ought to be, controlled by the decision maker?
	6. Decision environment: What is the decision environment for the system? That is, what resources and conditions of success are not, or ought not to be, controlled by the decision-maker?
Sources of Knowledge	***7. Expert:*** Who does, or ought to, provide relevant knowledge and skills for designing or using the system?
	8. Expertise: What are, or ought to be, relevant knowledge and skills for designing or using the system?
	9. Guarantor: What is, or ought to be, the guarantor for the system? That is, what are, or ought to be, considered assurances of successful implementation?
Sources of Legitimacy	***10. Witness / Marginalisation:*** Who is negatively affected (i.e., marginalized) by the system and who does, or ought to, represent their interests?
	11. Legitimacy / Emancipation: What are, or ought to be, the opportunities for the interests of those negatively affected by the system to have freedom from it?
	12. Worldview: What are the worldviews the system is, or ought to be, based upon? How are, or ought, differing worldviews to be reconciled?

Adapted from Ulrich and Reynolds (2020).

multidimensional equity framework (McDermott et al., 2013) *post hoc* to interpret the implications of our findings for ZDCs' equity. We focused on contextual, procedural, and distributive equity. Although access equity has particular relevance to ZDCs, its analytical value is attuned to examining equity for smallholder farmers who require access to deforestation-free supply chains (Grabs et al., 2021). Access equity therefore had limited analytical value in the context of Liberia's oil palm concessions, which are dominated by a few companies with well-developed supply chains.

2.3. Methods

2.3.1. Sampling

Sampling was designed to: 1) "sweep in" the range of perspectives among stakeholders involved with or affected by oil palm concessions and ZDCs (Churchman, 1979), including those held by marginalised stakeholders, and 2) ensure perspectives were included from communities with diverse experiences of oil palm expansion and forest conservation. These objectives justified a purposive quota sampling approach (Robinson, 2014) with a target of at least three participants from each stakeholder group to identify contrasting perspectives (Onwuegbuzie & Leech, 2007). We identified stakeholder groups by combining a conceptual framework for supply chain sustainability (Newton et al., 2013) with the four social roles defined by Critical Systems Heuristics (Ulrich & Reynolds, 2020). This led us to identify six "organisational" stakeholder groups: national government, intergovernmental organisations, companies, international NGOs (INGOs), national/local NGOs (NNGOs), and others (e.g., consultancies). We also identified communities living in or around the concession as a stakeholder group. The notion of "community" in Liberia is complex; here, we use it to mean a town comprising residents of varying descent working contiguous or adjacent areas of land (Richards et al., 2005).

Communities varied by their proximity to oil palm estates, forests, and available farmland (Fig. 1). Sampling was designed to reflect this variability and ensure a range of community perspectives were surveyed. Within each community, sampling was stratified to include a Chief; Chairlady (women's representative); Youth Chairman (youth representative); member of the Multi-Stakeholder Platform committee; and at least one participant who did not possess an official position. Detailed sampling methods are described in **Supplementary Information**.

2.3.2. Fieldwork

Fieldwork was conducted in Liberia in April – May 2019, after the RSPO adopted the HCSA in 2018. Semi-structured interviews were primarily conducted in English using an interview guide (**Supplementary Information**) developed using the Critical Systems Heuristics boundary questions and trialled in an earlier study (Lyons-White et al., 2022). All participants gave written informed consent to participate. Interviews were conducted under condition of anonymity and confidentiality.

During data collection, some community participants were more comfortable speaking in *Vai* (a local language) than English. In these interviews (n=17), co-author P.A.Z. acted as an interpreter. Although the interview guide was not translated, P.A.Z. was familiar with the questions having already co-conducted 13 interviews in English alongside the lead author. Group interviews (n=8) were conducted where participants expressed a preference to participate with their peers. All interviews were audio-recorded, subject to participants' consent (consent to record was withheld in three community and four organisational stakeholder interviews). Detailed fieldnotes were made in every interview. In total, 94 interviews (86 individual and eight group interviews) were conducted with 113 participants, representing 32 organisations (40 participants) and 14 communities (73 participants, of which 22 [30%] female) (Table 4). Group interviews were conducted with five organisations and three communities. Community participants' roles and livelihoods are shown in Table 5.

As interviews progressed, fieldnotes were reviewed and used to develop a preliminary "reference system", structured using the Critical Systems Heuristics boundary questions. As the reference system took shape, preliminary findings (**Supplementary Information**) were shared with participants for comment by email (for organisational stakeholders) or in-person (for communities), and feedback was recorded.

2.3.3. Analysis and boundary critique

The aim of analysis was to develop a reference system by subjecting participants' perspectives to boundary critique: assessing the relevance, justification, and ethical defensibility of boundary judgments (Ulrich & Reynolds, 2020). Analysis began in the field by reviewing the fieldnotes from all interviews as data collection progressed and using these to develop the preliminary reference system. Memos were also written throughout the analysis process to record emerging critiques and conflicts (Ulrich & Reynolds, 2020). Following fieldwork, all audio-recorded interviews were transcribed. Transcripts were then coded in NVivo (QSR International, 2021), alongside notes for non-recorded interviews, using the boundary questions as a coding framework. The aim of coding was to 1) identify important themes within each boundary category; 2) construct an individual reference system for each participant, structured using the boundary questions; and 3) use these

Table 5
Roles and primary sources of livelihoods for community members. The distribution of roles and livelihoods across communities is not shown to avoid revealing participants' identities.

Community roles held	N	Primary source of livelihood*	N
Chief or Deputy Chief	11	Oil palm plantation worker	14
Chairlady, Clan Chairlady, or Assistant Chairlady	14	Smallholder farmer	35
Youth Chairman or other Youth Council role	12	Small business†	5
Other official role in community**	5	Casual labour‡	3
Official role at higher level of administration than community	1	Teacher	3
Multi-Stakeholder Platform committee member	8	Full-time education	3
Town Elder	5	Construction	2
Community member with no formal role (of which female)	17 (8)	Informal logging ("pit sawyer")	1
Total (of which female)	**73 (22)**		**66**

* Primary source of livelihood mentioned by participants. Six participants held positions as local officials and did not mention another livelihood, so fewer livelihoods are stated (66) than there were participants (73). Secondary livelihood activities were mentioned by some participants and included subsistence farming, selling farm produce, driving a motorcycle taxi, midwifery, baking, charcoal production, and herbalism. One participant reported working on the oil palm plantation as a contractor to supplement their primary source of income.
** Other roles held included Quarter Chief and Community Watch Forum member.
† Small business activities included selling dry goods, water, frozen foods, cooked food, and charcoal.
‡ Casual labour activities mentioned included construction, charcoal production, and timber sawing.

Table 4
Summary of participant interviews (n=94) organised by stakeholder group. Interviews are shown across: A) organisations (n=31, plus Project Affected Communities Committee); and B) communities (n=14). Communities are grouped by their representative Multi-Stakeholder Platform. Interviews for which participants' individual reference systems were reconstructed through coding are shown in brackets.

A) Organisations **Organisational stakeholder group**	**Sampled organisations**	**Individual interviews**	**Group interviews**	**Total participants**
Companies	6	5 (4)	1 (1)	7
Government departments / agencies	6	6 (5)		6
International NGOs (INGOs)	6	5 (3)	1 (1)	7
Intergovernmental organisations	3	2 (2)	1 (1)	5
National / local NGOs (NNGOs)	5	3 (3)	1 (1)	6
Other	5	5 (4)		5
Project Affected Communities Committee	1		1 (1)	4
Total	**32**	**26 (21)**	**5 (5)**	**40**

B) Communities **County**	**Multi-Stakeholder Platform**	**Sampled communities**	**Individual interviews**	**Group interviews**	**Female participants**	**Total participants**	**Interviews in *Vai***
Bomi	Senjeh Action for Peace and Development	Dama	5 (3)		2 (1)	5	3 (2)
	Gorbla Land Committee	Malemagorbla	5 (3)		2 (2)	5	1 (1)
Grand Cape Mount	Zodua Land Management Committee	Falie	5 (4)		2 (1)	5	2 (1)
		Gohn Zodua	6 (3)		1	6	
		Kanga	6 (4)		2 (1)	6	4 (2)
	Project Affected Communities	Ballah Town	6 (3)		2 (2)	6	1 (1)
		Damah	5 (4)		2 (2)	5	3 (2)
		Nimba Point	1 (1)	1 (1)	1 (1)	4	
		Kon Town		1 (1)	1 (1)	7	
		Gbahfoboi	4			4	
		Gondeh Town	5		2	5	1
		Madina #2	5		2	5	
		Timbo	5		2	5	2
		Siafeh Kef	2	1	1	5	
	Total	**14**	**60 (25)**	**3 (2)**	**22 (11)**	**73**	**17 (9)**

reference systems to identify and critique contrasting boundary judgements. For the community interviews, coding proceeded in an order designed to provide even coverage of the different community roles as coding progressed. Coding started with Zodua Land Management Committee communities, which were most affected by ZDCs. It then cycled through the Gorbla Land Committee, Senjeh Action for Peace and Development, and Project Affected Communities, the latter of which were most numerous in the sample. As coding proceeded, individual participants' reference systems were mapped in the "is" and "ought" modes using Microsoft Excel (2021). A "map" of the overall reference system was developed concurrently, using the preliminary reference system as a basis and with boundary judgments organised by stakeholder group. Coding proceeded until it was judged that the major boundary judgements and conflicts within each boundary category were represented in the overall reference system. This point was reached after individual reference systems were constructed for 26 organisational and 27 community interviews (including individual and group interviews; Table 4). This included 9 interviews in *Vai*. Thereafter, analysis continued by re-reading the transcripts, fieldnotes, and memos from the remaining interviews to refine the reference system, identify illustrative quotes, verify that no important boundary judgements had been missed, and check for conflicting perspectives. The final reference system was refined further by reading the notes from the participant feedback sessions, although no substantial alterations were required.

The reference system is presented in the Results as a narrative synthesis, providing a qualitative description of the problem situation. It is structured using the Critical Systems Heuristics boundary categories, grouped as in Table 3. The reference system represents the lead author's boundary judgements, and also those of the co-authors who reviewed, discussed, and commented on the reference system as it developed. Collectively, these boundary judgements influenced both the research question and the interpretation of the data. The reference system is therefore partial. To make this partiality transparent, a positionality statement is provided for each author (**Supplementary Information**). "Zero deforestation" refers to the concept of zero deforestation unless reference is made to ZDCs.

Table 6
Map of the reference system for zero deforestation in Liberia, showing key findings organised by boundary category. The map complements the reference system and provides a guide to assist with its navigation, as well as a tool to inform policy discussions.

1. Purpose	2. Beneficiaries	3. Improvement	4. Decision-maker	5. Resources	6. Decision environment
• ZD is framed by economic development and climate change imperatives. • In this situation, the purpose of ZD includes mitigating climate change; conserving biodiversity, forest resources, and ecosystem services; and protecting traditional culture and rural livelihoods. • ZD may be considered a problematic concept. More feasible if it refers to primary forests, not regenerating fallows.	• There was broad consensus that the primary beneficiaries of ZD should be local forest communities. However, other groups' needs must also be considered, including non-forest communities and Liberia as a whole. • ZD could benefit all groups by providing resources, ecosystem services and payments for ecosystem services, and reputational benefits. At present, benefits of oil palm and ZD are not evenly distributed.	• ZD means using non-forest land for oil palm. ZD should support national legislation, such as the Forestry Reform Law (2006), and international commitments such as the Liberian–Norwegian REDD+ agreement. • Paid work with benefits was seen as an essential outcome both in itself and for achieving ZD by reducing subsistence pressure on forests. • Need incentives for conservation at local and national scales, and through supply chains.	• ZD agenda is driven by international community. • Liberia's government is decision-maker for land use legislation, regulation, and policy. Government agencies need to lead coordination, monitoring, and regulation. Communities must participate in decision making about ZD. • Companies are not key decision-makers and do not own HCS areas, but are responsible for ensuring HCS areas' conservation.	• Liberia's land tenure regime is key for achieving ZD. • Concession allocation without community consent, land tenure reform, and company ZD commitments have collectively produced what some participants called "land scarcity". This limits oil palm expansion and constrains employment, with implications for success of ZD. • Forest definitions should recognise social factors, such as development and employment needs. A national interpretation of ZD and/or the HCSA is required.	• Liberia's historical context led to the urgency of economic development but the concession model is problematic, as concessions were allocated in forested and populated areas without communities' consent being adequately obtained. • Weak governance (low coordination, low technical and financial capacity, and corruption) constrains potential for ZD oil palm development.
7. Expert	**8. Expertise**	**9. Guarantor**	**10. Marginalisation**	**11. Emancipation**	**12. Worldview**
• International expertise in ZD was recognised. Communities also recognised the role of NGOs in providing information and capacity building. • Recognition of government expertise in forestry was tempered by concerns about understanding of sustainability issues. There is a need for technical (rather than political) appointments in technical government departments.	• Need detailed land use planning and economic analyses of trade-offs between oil palm development and conservation. • Building communities' awareness and capacity is essential to ensure support for ZD and empower communities in decision-making and negotiating. • Need for improved understanding about communities by other stakeholders, including how to communicate to communities and promote conservation.	• Existing state regulation and private ZD commitments are insufficient. State regulation is poorly enforced, while ZD commitments may cause deforestation to spill-over from companies to communities, or companies to divest from Liberia. • ZD depends on: a national vision and strategy, executed through a national land use plan, to improve coordination in government and between sectors; finance and incentives for conservation; and improved community participation in conservation.	• Communities have been severely marginalised, but other groups (e.g., companies) are also affected by the current situation. • Failure to obtain communities' consent for oil palm expansion, and unmet expectations for development, have produced discontent and impaired livelihoods. Conservation Agreements were viewed positively but insufficient to meet communities' needs. • Communities require support to improve self-representation.	• A more community-centric approach to oil palm and ZD is required. Free, prior, and informed consent is essential. Communities should be involved in decision-making, including in RSPO, land use planning, law- and policy-making. • Alternatives to forest-based livelihoods must be provided. Community oil palm requires funding. • These processes should be supported by forest definitions specific to Liberia's situation.	• Community, country, and international needs must be resolved, demanding nuanced dialogue and the localisation of international concepts such as ZD. • National dialogue could improve education, build mutual understanding, and facilitate participatory management. • Communities' needs for survival and development must be integrated into ZD, but communities' expectations of oil palm development must also be managed.

HCS: High Carbon Stock; REDD: Reducing Emissions from Deforestation and Degradation; RSPO: Roundtable on Sustainable Palm Oil; ZD: Zero Deforestation

3. Results

A map of key findings (Table 6) complements the reference system presented in the following text.

3.1. Reference system

3.1.1. Purpose, beneficiaries, and measures of success of zero deforestation

The purpose of zero deforestation was discussed in relation to Liberia's need for economic development and the need to address climate change, which were recognised across groups. The reported purposes of zero deforestation included mitigating climate change; conserving biodiversity and forest resources; maintaining ecosystem services such as precipitation and shelter from wind; and protecting rural livelihoods and culture. In Project Affected Communities, some participants lamented the loss of forests and forest-based livelihoods:

> "If this community got a forest, like before, and they gave it to any company [which] cleared the forest and they are crying right now. It has served as an experience. It is better to preserve the forest, which will even help the community to stop wind… More than giving it to a company to destroy it, and then we cannot even get employment." (Project Affected Community member)

However, participants across stakeholder groups were also concerned that zero deforestation could be problematic if it did not provide economic benefits:

> "Yeah we agree to save the forest, but what are we saving the forest for? What we getting from the forest for now? Nothing we getting from the forest. So, if we save this, it will become a problem for us. Maybe better we give it up to the investor, to invest there, while they give you all employment." (Project Affected Community member)

Across all stakeholder groups, there was generally consensus that the primary beneficiaries of zero deforestation should be local communities:

> "Because [local people] live near the forest, they depend on the forest to live. If you say they shouldn't go there to farm, they shouldn't go there to hunt, there should be an alternative." (Project Affected Community member)

However, one NNGO and two company participants argued that local communities must not be the only beneficiaries of zero deforestation. Participants from companies, government, NGOs, and consultancies recognised that diverse stakeholders should benefit, including other Liberian citizens, future generations, and the world as a whole. However, companies, some government officials and some community members also claimed zero deforestation serves the international community at Liberia's expense. This revealed perceived inequity in the distribution of costs and benefits between Liberia and other countries:

> "It's a fine line between where you try to save the world but harm yourself. Most nations in the world, coming out of mishaps like war and other unfortunate situations, most of them were able to develop by exploiting forests and a lot of these other things. We're having to find our place at a time in this world where, all of a sudden, we're supposed to be the saviour. What is the net benefit of our involvement, of signing onto these protocols? Are they actually crippling our economy, as opposed to being an economic benefit? I wrestle with that." (Government official)

As a measure of success for zero deforestation, participants from INGOs, government, companies, and intergovernmental organisations spoke of using "degraded" land for oil palm. Participants from Zodua and Gorbla communities spoke of using "young bush": fallows at early stages of regeneration after farming (Fig. 2; further details in **Supplementary Information**). Government participants discussed the need to achieve national conservation commitments, including the target to retain 30% forest cover.

Considering Liberia's need for economic development, success for the oil palm sector was discussed in terms of alleviating poverty through the provision of paid employment, education, healthcare, sanitation, and other services. These services could be expected to promote distributive equity by improving the distribution of benefits across communities:

> "But coming to the development of all, using the means of planting more palms, yes, the community love it. Because if the palm extends, our younger brothers, sisters will be employed." (Zodua community member)

Most community participants (48 of 63 interviews) stated

Fig. 2. Community land uses and land use activities in Liberia. Clockwise from top-left: land preparation for farming using fire; "young bush" (fallows in early stages of regeneration) with *Acacia*; planted cassava field; "high bush" (more mature fallows) with larger trees; passing through forest; remains of pit-sawing (informal logging), showing a felled tree and planks. Photographs by lead author.

expectations that palm oil companies should provide these services; in 18 interviews, participants explicitly framed such benefits as being necessary exchange or compensation for land given to companies for oil palm.

Paid employment was also discussed as an important measure of success by participants from companies, government, INGOs, NNGOs, consultancies, and communities. In some Project Affected Communities, most youth not employed by the palm oil company were reputed to be engaged in pit-sawing (informal logging; Fig. 2) or charcoal production. Some participants from companies, NNGOs and communities presented the provision of paid employment or alternative livelihood opportunities as being critical for the success of zero deforestation:

> "You know, we can create 3,000, 4,000 jobs with an intelligently crafted evidence-based strategy that would – I would like to use the word "kill" – the incentive to go and do charcoal and cut down the forests." (National NGO)

One female member of a Project Affected Community linked increased subsistence pressure on forests to the displacement of community farmland by the expansion of oil palm plantations without adequate paid employment opportunities to replace lost livelihoods:

> "If people don't have jobs they will have to go in the forest to live. I can go in the forest, I go and make my farm." (Project Affected Community member)

Nearly half (n=35) of community participants reported farming as their primary livelihood (Table 5), cultivating cassava, rice, and vegetables for subsistence, with surplus sold at local markets. Few opportunities for paid employment were reported besides working on the oil palm plantation. Plantation workers (n=14) described working 8 hours per day, 6 days per week for a daily wage and benefits including two bags of rice per month, healthcare, and education for up to six dependents. Across communities, participants were positive about employment on the plantation; as seven participants explained, subsistence livelihoods based on farming are "*very hard*" (Zodua Community Member), making plantation work preferable: "*Before, we needed to strain ourselves to make farm, but now, I do not strain myself too much*" (Project Affected Community member). However, three workers reported that wages were too low. One explained that low wages were especially problematic given the low volume of employment in their community, where at most one person was employed per household. In this participant's opinion, life was better before the company came, because subsistence farming had at least allowed people to be self-sufficient.

Another measure of success discussed by participants from each of a consultancy, government, INGO, and intergovernmental organisation were national-scale incentives, such as REDD+, and local-scale incentives for communities, such as alternative livelihood opportunities and Conservation Agreement benefits. However, some community members and NNGOs proposed that community oil palm or outgrower schemes offered a more sustainable model than Conservation Agreements, which a local NGO described as a "hand-out":

> "Now, when a community farm is developed, then that is the sustainability for communities. But not with those hand-out issues where you come and get sheep or pigs or… compensation, how do you call it? Gifts, scholarships for elementary students, one year. Of course, yes, it's a pilot project, but even doing a pilot, we should be thinking about big things to happen." (Local NGO)

Six participants from government, intergovernmental organisations, companies, NNGOs, and consultancies used the word "balance" to describe success in achieving zero deforestation. The need for balanced conservation and development was characterised by the slogan, "*Iborlum iyaborto*" ("eat some and leave some"), which was mentioned by three participants from Zodua communities and one government official.

3.1.2. Decision makers, resources, and the decision environment for zero deforestation

Participants from companies, government, intergovernmental organisations, and NGOs reported that the zero-deforestation agenda is driven by the international community. Across these groups, however, Liberia's government was viewed as the decision-maker regarding a key resource: land.

Since Liberia's founding as a republic in 1847, sovereignty over land had been vested in the government (Stevens, 2014). Consequently, from the companies' perspective it was appropriate to have negotiated concession agreements with government as the legal landowner. However, other stakeholders criticised the concession negotiation and allocation process. One local NGO described how oil palm concessions incorporated abandoned former concession areas, which the government guaranteed were "free of encumbrances" but were in fact occupied by communities. Another NNGO claimed concession agreements had "*rode roughshod*" over the rural land regime, in which customary land rights existed but were defined ambiguously relative to public land (Stevens, 2014). Participants across groups claimed companies had not observed FPIC procedures with communities (FPIC had been implemented, but inadequately; Atkinson, 2015) and NNGOs criticised the government for allocating concessions in forest areas.

The inadequate recognition of customary land rights, or even communities' presence in concession areas, both in law and by government and company officials (Atkinson, 2015), revealed an uneven playing field in which communities had lacked access to decision making during concession negotiations. This contextual inequity hampered the sustainable development of Liberia's oil palm sector. Initially, the allocation of concessions led to farmland being cleared, damaging some communities' livelihoods. Complaints by communities in the Sime Darby, Golden Veroleum, and Equatorial Palm Oil concessions to the RSPO (2011, 2012, 2013) led to improved engagement with communities by companies, including improved observation of FPIC (Atkinson, 2015). In 2018, the Land Rights Act (Republic of Liberia, 2018a) introduced land tenure reforms and customary land is now legally owned by communities. These steps improved contextual equity by enhancing communities' access to decision-making power. However, some communities' experiences of losing farmland led them to report that they would now refuse for more land to be cleared for oil palm unless their expectations for employment and other benefits were met using land that had already been developed:

> "So, we appreciate the company, what they have done… [But] we told them that the land, we cannot give all to them. Because we ourselves we need something for tomorrow. The one that we give them, let them clear that one first." (Project Affected Community member)

Companies' adoption of ZDCs also constrained their potential to expand oil palm and provide more jobs:

> "Our hands are tied; we have signed a business agreement, but we are not allowed to do development because of our international agreements." (Company representative)

These problems combined to produce what company and government participants called "*land scarcity*": a lack of available land for companies to expand plantations and fulfil their obligations to develop concessions entirely within 20 years (Republic of Liberia, 2009). This, in turn, limited companies' abilities to provide employment and associated benefits that were anticipated in concession agreements, including sanitation, housing, medical care, education, and infrastructure. By 2015, Liberian oil palm concessions enabled the employment of only 10,000 people across the country and 3,000 in the Sime Darby concession (Atkinson, 2015), far fewer than planned (Table 1). One community member described how communities' hopes for development had been dashed:

> "If the investment was extended beyond this, more employment would have been done, more opportunity will come, more facilities will be given, like education, like health, the roads… But because of the ban [moratorium on clearing], they are not extending further. So other communities sit in the pool of the water, but they are thirsty." (Project Affected Community member)

Consequently, contextual inequity in Liberia's land regime when concessions were allocated led to distributive inequity in the costs, benefits, and risks associated with the development of the palm oil sector and implementation of ZDCs. Some costs of zero deforestation were carried by companies, which were still expected to pay rent on entire concessions while providing employment and other benefits to communities:

> "We are working on education. We are working on community development. We are working on community economic emancipation. We are working on employment. We are working on… I mean, name it! Every single company is doing all of those things. But this counts for nothing. That's why I said move that company from there, or compare it before they came: what was the situation? And ask yourself whether the company is a devil or an angel." (Company representative)

Meanwhile, the benefits and costs of oil palm development and zero deforestation were unevenly distributed between and within communities, in part due to the spatial distribution of former oil palm plantations, community farmland, and forests when concessions were negotiated. For communities in areas where oil palm was developed, farmland was lost but some employment opportunities became available. For communities in highly forested areas, the promised benefits of oil palm expansion never materialised due to zero deforestation (details below). Some participants feared these interacting problems could increase subsistence pressure on forests. For example, one local NGO and one community member claimed that migrant labourers seeking work in concessions pursued charcoal production, pit-sawing, and shifting agriculture in lieu of paid employment.

Besides land, another important set of "resources" for achieving zero deforestation were forest definitions and tools such as the HCSA. Some company representatives were aware that the HCSA applies a qualitative definition based on forest structure. Others believed that the HCSA definition was determined by aboveground biomass of 35 tonnes of carbon per hectare, although this threshold derived from an expired version of the methodology (Golden Agri Resources, 2011). These latter participants argued that the HCSA threshold should be "relaxed" to enable oil palm expansion, facilitate employment, and reduce subsistence pressure on forests. More broadly, defining "*overgrown*" (Consultant) or fallow areas as forest was widely considered to be inappropriate. Although Liberia already had a national forest definition, participants from companies, INGOs, a consultancy, and an intergovernmental organisation called for a national interpretation of "zero deforestation" and/or the HCSA that would take Liberia's biophysical context and socioeconomic development needs into account:

> "For me, a zero deforestation approach in Liberia involves a people-centred sort of socioeconomic approach towards conservation of forests." (Intergovernmental organisation representative)

More broadly, the decision environment was perceived to be characterised by governance and economic challenges that constrained the potential for sustainable and inclusive oil palm development. Poor coordination between government agencies, limited financial, technical, and logistical capacity, elite capture of tax revenues, and Liberia's extractive, rentier-oriented economy were cited as problems. Across stakeholder groups, effective ZDCs were perceived to require intra-governmental and inter-sectoral coordination, land use planning, finance, and community participation to collectively improve land use decision making, facilitate information sharing and deforestation monitoring, increase investor confidence, and enable agricultural development.

3.1.3. What experts and expertise are required? What would guarantee successful zero deforestation?

Participants across stakeholder groups recognised the value of international expertise on zero deforestation. Consultants, intergovernmental organisations, and INGOs viewed technical capacity to implement sustainability policies within the government as being lacking and resulting from political rather than technical staff appointments, low pay, and unappealing jobs. These participants called for increased technical capacity in government and better deployment of skills, alongside improved understanding in the Legislature and Executive about the importance of forest conservation and sustainable development. More generally, calls were made for social research to understand land management and deforestation drivers, and for economic analyses of trade-offs between oil palm development and conservation. INGOs also called for improved international understanding of Liberia's national situation, which they felt was poorly recognised in methodologies like the HCSA.

Government officials claimed the Environmental Protection Agency (EPA) and Forestry Development Authority (FDA) can support compliance with zero deforestation through existing regulation and policies, such as Environmental and Social Impact Assessments. However, an INGO argued that while Liberia's laws are progressive, they are poorly enforced. Companies' ZDCs were not viewed by consultancies, companies, or INGOs as guaranteeing forest conservation, as these participants all claimed deforestation could continue to be driven by subsistence activities. Companies and INGOs also argued that ZDCs could incentivise committed companies to divest from Liberia due to land scarcity and the risk of inadvertently committing environmental and human rights abuses.

Participants discussed the need for governance reforms to support zero deforestation, including incorporating zero deforestation into national law to facilitate enforcement. Across organisational stakeholder groups, calls were made for a national vision and strategy for sustainable palm oil (a National Oil Palm Strategy & Action Plan was published in 2021). Participants from these groups called for improved coordination between government agencies, industrial sectors, and stakeholder groups:

> "For zero deforestation, you have to have various partners working very closely together, but in sort of a meaningful arrangement. Oftentimes, you hear about zero deforestation and people will naturally think about the FDA [Forestry Development Authority], but then you say, "Oil palm." They go, "Oh, no, the Ministry of Agriculture." So how do the two work well together?" (Intergovernmental Organisation)

Calls were also made for land use planning to promote coordination between government agencies and industrial sectors, improve regulation and monitoring of land-use, and promote conservation of contiguous forest areas. A National Land Use and Management Policy is in development (Cooper-Dossen et al., 2020). More broadly, an NNGO participant argued for specific economic and governance reforms to underpin a coordinated national approach to sustainable development, including an end to Liberia's rentier-oriented economy, alternative finance including public–private partnerships, and evidence-based policymaking. This participant described how these reforms require international support, political will, and incentive-based conservation payments (e.g., through REDD+) to support zero-deforestation economic growth in Liberia.

Across stakeholder groups, participants emphasised the importance of raising communities' awareness about the benefits and disadvantages of oil palm, the importance of forests and climate change, and land rights, given that conservation depends on community support:

> "So, when they see benefits other than degrading the forest will provide, along the education, then they make informed decision. Then their decision will automatically run along the line of sustainable management for generations." (Government official)

An NNGO argued that these activities must be undertaken by local NGOs with local understanding. Across groups, participants stated that education must be complemented with alternative livelihood opportunities so communities do not have to use forests. Companies argued that this made employment in the oil palm sector essential, but this view also held wider support; for example, an NNGO called for a plan to develop the palm oil value chain and provide paid employment to reduce pressure on forests while providing tax revenues, livelihoods, and food security. Considering existing challenges with concessions, however, another NNGO claimed the only guarantor of sustainable oil palm development would be community oil palm or outgrower schemes.

3.1.4. Who is marginalised by zero deforestation, how should they be emancipated, and how should different worldviews be reconciled?

The marginalisation of communities from the policy processes directing oil palm development and zero deforestation was among the strongest themes to emerge. With respect to the development of the oil palm concessions before ZDCs were adopted, participants across groups noted that communities had been excluded from concession negotiations and companies failed to adequately observe FPIC, signifying procedural inequity. In Project Affected Communities, where oil palm was developed in 2009, communities presented grievances including the loss of farmland and forest, which damaged livelihoods, and unmet expectations for employment, education, healthcare, and sanitation. Within these communities, some female participants described how decision-making was dominated by older, male citizens.

In Zodua, where communities signed a Memorandum of Understanding with Sime Darby in 2013 for oil palm to be developed, reputedly only 365 ha of oil palm had been planted due to zero deforestation. All Zodua community members recognised the importance of conserving forests and they were broadly positive about the benefits received through Conservation Agreements. Organisational participants explained that Sime Darby had engaged the Good Growth Partnership to develop Conservation Agreements to ameliorate the impacts of zero deforestation for communities after oil palm development had been suspended. Even so, some Zodua community members perceived themselves as "*victims*", carrying the costs of zero deforestation through forgone opportunities for paid employment and community development, which was "*very unfair*". The lack of sanitation, education, healthcare, and road access in these communities were considered desperate. The spatial distribution of land use and forests prior to the concessions' establishment and Sime Darby's adoption of a ZDC thus produced contextual inequity for these communities in terms of their access to non-forest land that could be used for oil palm. This contextual inequity influenced the subsequent distribution of costs and benefits associated with oil palm development and zero deforestation. Zodua communities missed out on oil palm and were restricted in their use of the forest, and although Conservation Agreement benefits were valued, they were not yet considered sufficient to alleviate poverty.

Participants discussed the need for a more community-centric approach to oil palm development and forest conservation. The Land Rights Act (2018) and establishment of national FPIC guidelines (Republic of Liberia, 2019) can be expected to improve procedural equity by recognising customary land rights and clarifying mandatory procedures for community participation in land-use decisions. However, calls were also made for increased community involvement in policy- and decision-making in international forums such as the RSPO. This would require building communities' capacity to negotiate and make informed decisions by, for example, strengthening local institutions like Multi-Stakeholder Platforms with financial and technical support. Community representatives claimed they must also receive sustainable livelihood alternatives, or compensation, if zero deforestation means agricultural expansion is restricted or they cannot use forests:

> "But while we are reducing global warming, how do we survive, how do we live? Because even prior to the coming of [the concessionaire] … almost everyone here was farmers. Unlike now, they have come, and then, they did some clearing, this is why you see now people doing company work. But we all farmers. So, you will have to tell us, what will be the impact of zero deforestation? Then, how do we cope with it?" (Project Affected Community member)

In Zodua, a local NGO argued for a community oil palm farm to be established, and community members wanted oil palm development in the young bush:

> "The development should be done in the surrounding forest, because they have left that for us to do our activities there. And we can't live, we can't keep living on burning coal and things, so companies should come in and then really develop that area so that we can be benefitting." (Community member, Zodua community)

The multiple perspectives on zero deforestation and oil palm development were characterised by an INGO as representing a tension between community, country, and international needs. This participant explained how resolving this tension requires nuanced global dialogue and the localisation of international concepts like zero deforestation, whose legitimacy may otherwise be questioned:

> "I think the starting point is to first of all determine whose idea is it? It is a Western concept, it's being developed elsewhere. Therefore, should that be applied in the strict sense that has been developed? For me, the question that I have about that is legitimacy." (INGO representative)

Some government officials and INGOs asserted Liberia's sovereignty when discussing international pressure for zero deforestation. At the national level, participants called for government to lead a dialogue to improve education, share knowledge, and build mutual understanding, for example through the National Oil Palm Platform of Liberia. However, participants diverged on how a national dialogue should be framed. Whereas an intergovernmental organisation representative emphasised the importance of accommodating communities' traditional values, environmental exigencies, and economic imperatives simultaneously, an INGO argued that conservation and development must be traded-off. This INGO viewed the nuances of the Liberian situation as being insufficiently understood in international discussions about zero deforestation. To address this at the global level, a company suggested increased engagement between governments and international institutions such as the RSPO, even if governments cannot be RSPO members.

4. Discussion

This study examined the implementation of ZDCs in Liberia's oil palm sector by applying Critical Systems Heuristics to examine stakeholders' perspectives. We found that the implementation of zero deforestation followed concessions' allocation without local communities' consent being adequately obtained (Atkinson, 2015). This resulted in discontent and somewhat paradoxical perspectives across concession communities. In areas where oil palm was developed, communities lost farmland but were provided with employment opportunities. However, the insufficient replacement of agricultural subsistence livelihoods with paid employment left these communities reluctant to agree to further expansion. Meanwhile, communities in forested areas were frustrated by limited oil palm expansion due to ZDCs and also had their access to forests curtailed. These latter communities were supported through Conservation Agreements that, while appreciated, were considered insufficient by some participants to alleviate poverty. Consequently, while the limited oil palm expansion reported by

participants suggests ZDCs may have been effective, in the context of Liberia's oil palm concessions this was perceived to have come at the expense of improved community welfare. Altogether, our findings suggest that neither the complete development of Liberia's oil palm concessions, nor limited development with zero deforestation, will necessarily achieve conservation and development goals simultaneously without reforming the concession system itself. In the remainder of the manuscript, we unpack the challenges of implementing ZDCs in Liberia's concession system. We then examine the implications of our findings for the equity of ZDCs in Liberia, making reference to McDermott et al.'s (2013) multidimensional equity framework. Finally, we discuss how ZDCs could be situated more harmoniously in Liberia's public governance context. Throughout, we propose leverage points to improve the equity and effectiveness of ZDCs in Liberia and other highly forested countries. Study limitations are discussed in the **Supplementary Information**.

4.1. Challenges of implementing ZDCs in Liberia's concession system

Our study revealed how the implementation of ZDCs in Liberia's oil palm concessions left some communities in highly forested areas without the benefits of oil palm development that they anticipated, including paid employment, sanitation, healthcare, education, and infrastructure. Previous research has found that the marginalisation of community groups is an archetypal cause of adverse livelihood outcomes in large-scale land acquisitions (Oberlack et al., 2016). Here, the marginalisation of communities in highly forested areas perpetuated a legacy of marginalisation. Communities with land claims in concession areas were excluded from concession negotiations and FPIC had been inadequately observed before companies' ZDCs were adopted (Atkinson, 2015; Lomax et al., 2012). More rigorous company FPIC procedures (Atkinson, 2015) and recognition of customary land rights in Liberia's Land Rights Act (2018) were introduced to address these issues. However, from the companies' point of view, concessions were "encumbered" by the presence of communities. This led to what some companies called "land scarcity": insufficient "unencumbered" land to expand oil palm and fulfil their concession obligations. ZDCs further constrained oil palm expansion – even where communities consented to development, as in Zodua – and, in turn, the creation of paid employment opportunities that communities desired. Consequently, while the limited oil palm expansion reported suggests ZDCs may have been effective, communities perceived themselves to have received inadequate welfare improvements, despite some losing farmland to oil palm and others receiving little development.

Where zero deforestation had been implemented in the Sime Darby concession, participants described how the company took steps to ameliorate its impacts by engaging the Good Growth Partnership to provide alternatives to forest-based livelihoods through Conservation Agreements. These agreements could provide a model to support communities where ZDCs are implemented. However, the agreements depended on international donor funding and their contingency was demonstrated when the pilot's renewal was postponed in 2020 due to COVID-19. Some community members' perspectives that Conservation Agreement benefits were unsustainable "handouts", despite communities having willingly entered the agreements, indicated the constrained choices available to them. This mirrors situations in Southeast Asia, where it has been posited that communities might accept changes to land use – whether agreeing to oil palm expansion or avoiding clearing forests – out of desperation to escape poverty or unequal knowledge or power (Cheyns et al., 2019; Mahanty et al., 2012). Conservation Agreements may thus be understood as expressions of social concern that address, but do entirely resolve, the marginalisation of communities by ZDCs (Midgley, 2000). Notably, community members in Zodua remained enthusiastic for oil palm expansion, which they viewed as offering consistent income, benefits including healthcare, education, and infrastructure, and less arduous labour than shifting agriculture. In communities where oil palm had been expanded, these benefits were valued, although their distribution within communities was considered inadequate.

Even if Liberia's oil palm concessions were fully developed, it is unclear whether this would provide the welfare improvements community participants anticipated. As observed here, previous research has found that large-scale agricultural investments can induce conflict and environmental degradation in agricultural frontiers when they cover large areas previously used by smallholders and generate limited employment (Oberlack et al., 2021). In the Sime Darby (now Mano) concession, full development has been projected to generate up to 125,000 jobs by 2041, or 80,000 jobs if all primary forests and 60% of secondary forests are conserved (Niesten & Sayon, 2020). However, evidence from Indonesia suggests welfare improvements do not always accrue to communities near oil palm concessions (Santika et al., 2019; Santika et al., 2021). Promises of employment in Indonesian oil palm plantations have often been overestimated and poorly remunerated (Li, 2024). The impacts of oil palm expansion can also vary depending on interactions with local livelihoods strategies and social relations (McCarthy, 2010). Furthermore, concessions in Liberia have historically been criticised for delivering economic growth but entrenching poverty by producing generations of low-wage labourers (Clower et al., 1966). Consequently, it is possible that neither complete development of Liberia's oil palm concessions, nor limited development with zero deforestation, will improve communities' welfare without reforming the concession system itself.

NNGOs argued that a more inclusive, community-led approach represented the only way to develop Liberia's oil palm sector equitably and sustainably. Several participants referred to community oil palm and smallholder development. However, financial models to support outgrower schemes in Liberia have not yet moved beyond pilots (c.f. Grow, 2017; Beveridge et al., 2016). A viable mechanism to provide finance and technical support for deforestation-free smallholder oil palm development is essential and has been identified as a core objective of Liberia's National Oil Palm Strategy and Action Plan (National Oil Palm Platform of Liberia, 2021). Any such mechanisms must address the potential for elite capture, exclusion of groups such as women, and power inequalities between smallholders and commodity traders (Ros-Tonen et al., 2019; Vicol et al., 2018).

4.2. Examining the implications of equity for ZDCs in Liberia's oil palm sector

We now discuss the implications of our findings for the contextual, procedural, and distributive equity of ZDCs in Liberia's oil palm sector. When oil palm concessions were allocated, customary land rights were defined ambiguously relative to public land (Stevens, 2014), leading the government to guarantee that concessions were "free of encumbrances". FPIC was also inadequately observed by companies (Atkinson, 2015). These factors limited communities' access to decision making, generating contextual inequity in a situation where communities were already impoverished and high forest cover constrained the availability of non-forest land for oil palm development. Communities' access to power and participation in decision making (procedural equity) improved following the legal recognition of customary land rights in 2018, the improved observation of FPIC by companies and the introduction of national FPIC guidelines (Republic of Liberia, 2019). Together, these reforms empowered communities to participate in decisions over oil palm development. Nonetheless, the contextual inequity amid which ZDCs were initially implemented produced distributive inequity. While companies carried the direct costs of ZDCs through constraints on their ability to develop concessions on which they were paying rent, some costs were also borne by communities and the distribution of benefits was uneven. In communities where oil palm had already been developed, farmland was lost but some employment and community development were provided. In highly forested areas where ZDCs were

implemented, forests remained but communities were left without the benefits they had anticipated from oil palm development. More broadly, participants claimed that Liberia's needs for development were poorly recognised by demands for zero deforestation in international markets, suggesting procedural equity persists at the international scale.

Some company and NGO participants linked the implementation of ZDCs in highly forested areas to the potential for deforestation by communities. These participants claimed communities might clear or degrade forests for livelihood activities in lieu of employment opportunities prevented by stalled oil palm expansion. In this way, the distributive inequity experienced by communities who are denied oil palm expansion could be hypothesised to attenuate ZDCs' effectiveness. More broadly, company and NGO participants claimed that deforestation and forest degradation caused by subsistence agriculture, charcoal production, and pit-sawing could be avoided by providing employment in concessions. All of these claims require substantiation. While shifting agriculture accounted for 47% (141,093 ha) of forest loss in Liberia between 2005 and 2014, oil palm expansion was projected to produce even more deforestation between 2016 and 2030 (160,000–352,000 ha; Goslee et al., 2016). Furthermore, the limited oil palm expansion (and, hence, limited potential displacement of farmland) described by participants here, alongside the reported implementation of Conservation Agreements, suggests ZDCs may have been effective in preventing deforestation. Consequently, it is not clear whether distributive inequity arising from the implementation of ZDCs did or would increase deforestation by local communities. Further research could examine whether any relationship exists between the stalled development of Liberia's oil palm concessions and community pressure on forests. A spatiotemporal analysis could examine the relative contributions of subsistence activities and oil palm to deforestation, elucidating whether distributive and procedural equity interact with the effectiveness of ZDCs in this context.

Calls were made for local and national contexts to receive improved consideration when demands are made for zero deforestation in international markets and when tools and policies – such as the HCSA and RSPO – are developed to meet those demands. The co-production of rules is essential for effective and equitable ZDCs (Grabs et al., 2021) and NNGOs can improve the representation of local communities in the RSPO (Cheyns, 2014; Pesqueira & Glasbergen, 2013). At the time of writing, however, none of the NNGOs interviewed here were listed as members of the RSPO (2024) and there are no Liberian members of the HCSA (HCSA Foundation, 2024), perhaps due to the time or financial costs of membership. The complex composition of Liberian communities (Gilfoy, 2015) also emphasises the importance of working with local NGOs that understand them intimately. Communities themselves called for more opportunities for self-representation through Multi-Stakeholder Platforms. Improving financial and technical support for Liberian NNGOs and Multi-Stakeholder Platforms could improve Liberian representation in negotiations over sustainable oil palm development in international forums like the RSPO and HCSA, promoting procedural equity.

Some company and NGO participants emphasised the importance of accommodating Liberia's national situation in the HCSA. This argument can be examined in terms of the possibility of developing adapted HCSA procedures for use in highly forested contexts by either companies or communities. The existing HCSA Toolkit is designed for use by companies. It requires lands claimed by communities to be excised from concessions unless ceded by communities with FPIC (Rosoman et al., 2017). In Zodua, Sime Darby obtained the community's consent to expand oil palm by signing a Memorandum of Understanding with the Zodua Land Management Committee, but development was halted due to the subsequent identification of HCS forests. This explains Zodua community members' frustration that oil palm could not be developed. In such cases, adapting HCSA procedures could promote the HCSA's legitimacy (Lyons-White et al., 2022). However, stringent forest definitions are also an essential feature of effective ZDCs (Garrett et al., 2019). There are currently no plans to adapt the HCSA for companies and the Liberian National RSPO Interpretation did not include adapted HCSA thresholds (RSPO, 2021a; RSPO, 2021b). As such, under existing plans any adaptations of the HCSA for highly forested contexts can be expected to apply to community-led oil palm development only.

In 2018, the RSPO and HCSA Steering Group formed a "No Deforestation Joint Steering Group" to develop adapted zero deforestation procedures for oil palm development by indigenous peoples and local communities in high forest cover contexts (RSPO, 2021b). These procedures remain undefined (RSPO, 2023). However, a simplified HCV-HCS approach for smallholders has been trialled for Indonesia (HCSA Secretariat, 2023). This could provide some indication about the potential features of an adapted HCS procedure for communities in Liberia. The simplified HCV-HCS approach allows communities to use "important community areas" – including community forests used for shifting cultivation – for development, but only if their environmental and social values remain undiminished. This leaves it ambiguous whether communities in highly forested landscapes such as Zodua could develop their fallows with oil palm. The simplified HCV-HCS approach is also inapplicable to "scheme smallholders" tied to a mill or processing facility. This suggests a similar approach for Liberia would be inapplicable for community oil palm farms developed as part of company outgrower schemes. However, without such technical assistance from companies it is unclear whether Liberian communities would be able to develop oil palm plantations at all. Altogether, this evidence suggests that communities in highly forested landscapes that wish to develop oil palm may be left without an opportunity to comply with international standards for zero deforestation. A participatory process to adapt the HCSA for local communities in highly forested countries could address this lacuna.

Even with adapted HCSA procedures for communities, our research suggests that benefit-sharing mechanisms like Conservation Agreements – an essential component of equitable ZDCs (Grabs et al., 2021) – will be of particular importance in highly forested contexts where agricultural expansion is constrained. The HCSA Toolkit already requires the provision of conservation incentives (Rosoman et al., 2017) and research in Liberia has indicated that payments for environmental services can reduce community-driven deforestation (Christensen et al., 2021). However, if payments for environmental services are used, care must be taken to ensure that they reinforce the normative content of ZDCs rather than engendering a "right to clear" among elite recipients (Garrett et al., 2022). It is also uncertain how payments for environmental services or other conservation incentives can be financed if ZDC companies' revenues are limited by production constraints and supporting partners like the Good Growth Partnership are unavailable. ZDCs could be supplemented by carbon-based finance through REDD+ (Meyer & Miller, 2015), but this is problematic as commitments obviate the need for the "additional" forest protections required to generate carbon credits. The potential for deforestation-free agricultural development to generate credits therefore requires clarification in Liberia's national REDD+ strategy (Niesten & Sayon, 2020). If obtained, such finance could be used to support deforestation-free community oil palm and develop Liberia's palm oil value chain.

4.3. Situating ZDCs in Liberia's governance context

Liberia's government regulates forests through the National Forestry Reform Law (2006). Still, organisational participants called for a more systemic national approach to forest conservation and sustainable oil palm development to improve coordination between government and industry, improve community participation, and direct oil palm development to less-forested areas. The National Oil Palm Strategy and Action Plan (2021) represents a promising step towards addressing these calls for a coherent vision for sustainable oil palm development in Liberia's government.

From an international perspective, forest-focused supply chain policies that recognise countries' sovereignty may be considered more legitimate (Dermawan & Hospes, 2018; Lyons-White et al., 2022; Schouten & Glasbergen, 2011). For the recent EU Deforestation

Regulation (2023), this suggests its legitimacy could be enhanced by working with producing countries like Liberia to achieve convergence with corporate policies on forest definitions. In Brazil, ZDCs such as the Amazon Soy Moratorium have applied national definitions of native vegetation (Garrett, Cammelli, et al., 2021). Notably, however, legislation in Brazil diverges from corporate commitments by permitting some deforestation where ZDCs permit none. Jurisdictional land-use planning, called for by participants in this study, could help reconcile such contradictions in highly forested countries by supporting a more systematic approach to conservation and development (Lyons-White et al., 2022; von Essen & Lambin, 2021). Promisingly, a national land use plan for Liberia is in development (Cooper-Dossen et al., 2020).

5. Conclusions

The implementation of ZDCs in Liberia's oil palm sector took place against a backdrop of inequity following the allocation of concessions without adequate community participation. This produced a paradoxical situation where communities that lost farmland to oil palm were reluctant to allow further expansion, while communities in highly forested areas were frustrated by a lack of oil palm development. Our case study provides evidence that sustainable oil palm development in highly forested countries requires a more equitable approach than the simple imposition of "zero deforestation". Such an equitable approach is now promoted by the social requirements of the HCSA, which were adopted after the implementation of ZDCs in Liberia began. Ultimately, however, neither the complete development of Liberia's oil palm concessions, nor limited development with zero deforestation, may achieve conservation and development goals without reforming the concession system itself. Procedural and distributive equity would be improved by prioritising community-led oil palm development, employment, and education within a coordinated framework of land-use planning and conservation incentives. These efforts will require the development of novel mechanisms for financial investment in smallholder agriculture and participatory approaches to localise international standards and enable inclusive, community-led oil palm development with zero deforestation.

Funding

JLW was supported by the Natural Environment Research Council (NERC) grant NE/L002515/1 and the Royal Geographical Society (with IBG) with a Frederick Soddy Postgraduate Award grant FSPA 02/19.

CRediT authorship contribution statement

Joss Lyons-White: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Philip A. Zodua:** Writing – review & editing, Resources, Investigation. **Christian Mikolo Yobo:** Writing – review & editing, Supervision, Conceptualization. **Solomon C. Carlon:** Visualization, Resources. **Robert M. Ewers:** Writing – review & editing, Supervision, Conceptualization. **Andrew T. Knight:** Funding acquisition, Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: JLW received in-kind research support for this study from Conservation International Liberia, and has previously received in-kind research support from The Nature Conservancy Gabon and Olam Gabon. RME has received research funding from the Sime Darby Foundation. SCC is employed by Conservation International Liberia. PAZ is a member of the Zodua Land Management Committee.

Data availability

The data that has been used is confidential.

Acknowledgements

We are immensely grateful to all our participants for their time to participate in this research. We thank Jessica Donovan, Peter Mulbah, Steven Acire, George Ilebo, Edward Massaquoi, and colleagues at Conservation International Liberia for providing invaluable support with planning and executing the fieldwork. We also thank Alfred Sayee for providing logistical support in the field. We thank Martin Reynolds and Gerald Midgley for their expert advice on applying Critical Systems Heuristics. We thank Julia Jones and Morena Mills for helpful comments on an earlier version of the manuscript. Finally, we thank three anonymous reviewers for their detailed and thoughtful feedback which substantially improved the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.worlddev.2024.106803.

References

Alroy, J. (2017). Effects of habitat disturbance on tropical forest biodiversity. *Proceedings of the National Academy of Sciences, 114*, 6056–6061.

Atkinson, P. (2015). *HCS+ Consulting Study 17: Palm oil in Liberia: Missed opportunities and second chances*. HCS Science Study.

Austin, K. G., Lee, M. E., Clark, C., Forester, B. R., Urban, D. L., White, L., Kasibhatla, P. S., & Poulsen, J. R. (2017). An assessment of high carbon stock and high conservation value approaches to sustainable oil palm cultivation in Gabon. *Environmental Research Letters, 12*, Article 014005.

Baccini, A., Walker, W., Carvalho, L., Farina, M., Sulla-Menashe, D., & Houghton, R. A. (2017). Tropical forests are a net carbon source based on aboveground measurements of gain and loss. *Science, 358*, 230–234.

Bager, S. L., & Lambin, E. F. (2022). How do companies implement their zero-deforestation commitments. *Journal of Cleaner Production, 375*, Article 134056.

Beveridge, A., Lockwood, R., Azmi, R., & Sutton, A. (2016). GROW Liberia - Community Oil Palm Outgrower Scheme: Operational Plan. Penicuik, UK: LTS International and Greenstar Resources Ltd. Available at: https://www.idhsustainabletrade.com/uploaded/2017/06/Grow-Oil-Palm-Outgrower-operational-model.pdf. Accessed June 2021.

Butt, N., Lambrick, F., Menton, M., & Renwick, A. (2019). The supply chain of violence. *Nature Sustainability, 2*, 742–747.

Cammelli, F., Levy, S. A., Grabs, J., Valentim, J. F., & Garrett, R. D. (2022). Effectiveness-equity tradeoffs in enforcing exclusionary supply chain policies: Lessons from the Amazonian cattle sector. *Journal of Cleaner Production, 332*, Article 130031.

Chain Reaction Research (2019). The Chain: Sime Darby Aims to Responsibly Divest from Liberia by the End of 2019. Available at: https://chainreactionresearch.com/the-chain-sime-darby-aims-to-responsibly-divest-from-liberia-by-the-end-of-2019/. Accessed February 2024.

Cheyns, E. (2014). Making "minority voices" heard in transnational roundtables: The role of local NGOs in reintroducing justice and attachments. *Agriculture and Human Values, 31*, 439–453.

Cheyns, E., Silva-Castañeda, L., & Aubert, P.-M. (2019). Missing the forest for the data? Conflicting valuations of the forest and cultivable lands. *Land Use Policy, 103591*.

Christensen, D., Hartman, A. C., & Samii, C. (2021). Citizen monitoring promotes informed and inclusive forest governance in Liberia. *Proceedings of the National Academy of Sciences, 118*, Article e2015169118.

Chu, M.M., & Boyle, J. (2020). Sime Darby Plantations says completed exit from Liberia. Kuala Lumpur, Malaysia: Reuters. Available at: https://www.reuters.com/article/sime-darby-liberia/sime-darby-plantations-says-completed-exit-from-liberia-idUSL4N29L2ZU. Accessed February 2020.

Churchman, C. W. (1979). *The systems approach and its enemies*. New York, NY: Basic Books.

Clower, R. W., Dalton, G., Harwitz, M., & Walters, A. A. (1966). *Growth without Development: An Economic Survey of Liberia, 01/23 ed.* Evanston, IL: Northwestern University Press.

Colchester, M., Jiwan, N., & Kleden, E. (2014). Independent review of the social impacts of Golden Agri Resources' Forest Conservation Policy in Kapuas Hulu District. Moreton-in-Marsh, UK: West Kalimantan. Forest Peoples Programme and TUK Indonesia. Available at: https://www.forestpeoples.org/en/topics/palm-oil-rspo/publication/2014/independent-review-social-impacts-golden-agri-resources-forest. Accessed October 2024.

Colchester, M., & Anderson, P. (2015). HCS Science Study Consulting Study 11: Respecting rights and securing livelihoods in conserving 'High Carbon Stock' forests. *HCS Science Study*.

Cooper-Dossen, B. M., Kolleh, A. B., & Marvey, M. A. A. (2020). *Liberia National Land Use and Management Policy: Inception Report. Diffusion, Forestry Development Authority of Liberia, and Liberia Land Authority*. Monrovia, Liberia.
de Sousa, C., Fatoyinbo, L., Honzák, M., Wright, T. M., Murillo Sandoval, P. J., Whapoe, Z. E., Yonmah, J., Olatunji, E. T., Garteh, J., Stovall, A., Neigh, C. S. R., Portela, R., Gaddis, K. D., Larsen, T., & Juhn, D. (2023). Two decades of land cover change and forest fragmentation in Liberia: Consequences for the contribution of nature to people. *Conservation Science and Practice, 5*, e12933.
Dermawan, A., & Hospes, O. (2018). When the state brings itself back into GVC: The case of the Indonesian Palm Oil Pledge. *Global Policy, 9*, 21–28.
Dobson, A. P., Pimm, S. L., Hannah, L., Kaufman, L., Ahumada, J. A., Ando, A. W., Bernstein, A., Busch, J., Daszak, P., Engelmann, J., Kinnaird, M. F., Li, B. V., Loch-Temzelides, T., Lovejoy, T., Nowak, K., Roehrdanz, P. R., & Vale, M. M. (2020). Ecology and economics for pandemic prevention. *Science, 369*, 379–381.
Equatorial Palm Oil PLC (2017). Sustainability Report 2017.
Equatorial Palm Oil PLC (2020). 2020 Annual Report and Accounts. Available at: https://capitalmetals.com/wp-content/uploads/2021/01/2020-Annual-Report-and-Accounts.pdf. Accessed October 2024.
Faust, C. L., McCallum, H. I., Bloomfield, L. S. P., Gottdenker, N. L., Gillespie, T. R., Torney, C. J., Dobson, A. P., & Plowright, R. K. (2018). Pathogen spillover during land conversion. *Ecology Letters, 21*, 471–483.
Ferrante, L., Gomes, M., & Fearnside, P. M. (2020). Amazonian indigenous peoples are threatened by Brazil's Highway BR-319. *Land Use Policy, 94*, Article 104548.
Finer, M., Jenkins, C. N., Pimm, S. L., Keane, B., & Ross, C. (2008). Oil and gas projects in the Western Amazon: Threats to wilderness, biodiversity, and indigenous peoples. *PloS One, 3*, e2932.
Garrett, R. D., Levy, S., Carlson, K. M., Gardner, T. A., Godar, J., Clapp, J., … Villoria, N. (2019). Criteria for effective zero-deforestation commitments. *Global Environmental Change, 54*, 135–147.
Garrett, R. D., Cammelli, F., Ferreira, J., Levy, S. A., Valentim, J., & Vieira, I. (2021). Forests and sustainable development in the Brazilian Amazon: History, trends, and future prospects. *Annual Review of Environment and Resources, 46*, 625–652.
Garrett, R. D., Levy, S., Gollnow, F., Hodel, L., & Rueda, X. (2021). Have food supply chain policies improved forest conservation and rural livelihoods? A systematic review. *Environmental Research Letters, 16*, Article 033002.
Garrett, R. D., Grabs, J., Cammelli, F., Gollnow, F., & Levy, S. A. (2022). Should payments for environmental services be used to implement zero-deforestation supply chain policies? The case of soy in the Brazilian Cerrado. *World Development, 152*, Article 105814.
Gibson, L., Lynam, A. J., Bradshaw, C. J. A., He, F., Bickford, D. P., Woodruff, D. S., Bumrungsri, S., & Laurance, W. F. (2013). Near-complete extinction of native small mammal fauna 25 years after forest fragmentation. *Science, 341*, 1508–1510.
Gilfoy, K. (2015). Land grabbing and NGO advocacy in Liberia: A deconstruction of the 'homogeneous community'. *African Affairs, 114*, 185–205.
Golden Agri Resources (2011). Forest Conservation Policy. Available at: https://goldenagri.com.sg/wp-content/uploads/2016/01/1._GAR_Forest_Conservation_Policy_-_updated_links_10_Jan_2014.pdf. Accessed October 2024.
Golden Agri Resources Ltd (2011). Preserving the Present, Ensuring the Future: Annual Report 2011. Available at: https://www.goldenagri.com.sg/wp-content/uploads/2016/01/GAR_AnnualReport2011.pdf. Accessed October 2024.
Goslee, K., Walker, S., Mitchard, E., Grais, A., Netzer, M., Brown, K., … Mulbah, P. (2016). Development of Liberia's REDD+ reference level. Arlington, VA: Winrock International. Available at: https://www.forestcarbonpartnership.org/system/files/documents/Liberia%20Reference%20Level%20Report%20Oct%202016.pdf. Accessed October 2024.
Grabs, J., Cammelli, F., Levy, S. A., & Garrett, R. D. (2021). Designing effective and equitable zero-deforestation supply chain policies. *Global Environmental Change, 70*, Article 102357.
Grabs, J., & Garrett, R. D. (2023). Goal-based private sustainability governance and its paradoxes in the Indonesian Palm Oil Sector. *Journal of Business Ethics*.
Gregory, N., Ewers, R. M., Chung, A. Y. C., & Cator, L. J. (2022). Oil palm expansion increases the vectorial capacity of dengue vectors in Malaysian Borneo. *PLoS Neglected Tropical Diseases, 16*, e0009525.
Grow. (2017). *Case Study: Paving the way for an Outgrower Scheme in Liberia's Oil Palm Sector*. Monrovia, Liberia: Sida and Adam Smith International.
Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., Thau, D., Stehman, S. V., Goetz, S. J., Loveland, T. R., Kommareddy, A., Egorov, A., Chini, L., Justice, C. O., & Townshend, J. R. G. (2013). High-resolution global maps of 21st-century forest cover change. *Science, 342*, 850–853.
HCSA Foundation (2024). HCSA Membership. Available at: https://highcarbonstock.org/membership/. Accessed October 2024.
HCSA Secretariat (2023). HCS-HCV Simplified Smallholder Approach for Indonesia: Draft for approval. Available at: https://highcarbonstock.org/wp-content/uploads/2023/10/HCSA-SHWG-SIMPLIFIED-HCS_HCV-Smallholder-Approach-Oct-2023.docx. Accessed October 2024.
HCSA Steering Group (2018). HCSA Steering Group statement on high forest cover landscapes. Kuala Lumpur, Malaysia: HCSA Steering Group. Available at: http://highcarbonstock.org/hcsa-steering-group-statement-on-high-forest-cover-landscapes/. Accessed October 2024.
Hutcheson, M., Morton, A., & Blair, S. (2023). Exploring perspectives on agroecological transition in scotland with critical systems heuristics. *Systemic Practice and Action Research, 37*, 459–482.
Knight, A. T., Cook, C. N., Redford, K. H., Biggs, D., Romero, C., Ortega-Argueta, A., Norman, C. D., Parsons, B., Reynolds, M., Eoyang, G., & Keene, M. (2019). Improving conservation practice with principles and tools from systems thinking and evaluation. *Sustainability Science, 14*, 1531–1548.
Krishna, V., Euler, M., Siregar, H., & Qaim, M. (2017). Differential livelihood impacts of oil palm expansion in Indonesia. *Agricultural Economics, 48*, 639–653.
Kuepper, B., Lima, B., Steinwig, T., & Thoumi, G. (2017). Sime Darby: Liberian crossroads. Washington, DC: Chain Reaction Research. Available at: https://chainreactionresearch.com/report/sime-darby-liberian-crossroads/. Accessed October 2024.
Kuala Lumpur Kepong Berhad (2013). Annual Report. Available at: https://www.klk.com.my/wp-content/uploads/2017/07/klk_ar2013.pdf. Accessed October 2024.
Lambin, E. F., Gibbs, H. K., Heilmayr, R., Carlson, K. M., Fleck, L. C., Garrett, R. D., le Polain de Waroux, Y., McDermott, C. L., McLaughlin, D., Newton, P., Nolte, C., Pacheco, P., Rausch, L. L., Streck, C., Thorlakson, T., & Walker, N. F. (2018). The role of supply-chain initiatives in reducing deforestation. *Nature Climate Change, 8*, 109–116.
Lee, J. S. H., Miteva, D. A., Carlson, K. M., Heilmayr, R., & Saif, O. (2020). Does oil palm certification create trade-offs between environment and development in Indonesia? *Environmental Research Letters, 15*, Article 124064.
Li, T. M. (2024). Securing oil palm smallholder livelihoods without more deforestation in Indonesia. *Nature Sustainability, 7*, 387–393.
Lyons-White, J., & Knight, A. T. (2018). Palm oil supply chain complexity impedes implementation of corporate no-deforestation commitments. *Global Environmental Change, 50*, 303–313.
Lyons-White, J., Pollard, E. H. B., Catalano, A. S., & Knight, A. T. (2020). Rethinking zero deforestation beyond 2020 to more equitably and effectively conserve tropical forests. *One Earth, 3*, 714–726.
Lyons-White, J., Mikolo Yobo, C., Ewers, R. M., & Knight, A. T. (2022). Understanding zero deforestation and the High Carbon Stock Approach in a highly forested tropical country. *Land Use Policy, 112*, Article 105770.
Mahanty, S., Milne, S., Dressler, W., & Filer, C. (2012). The social life of forest carbon: Property and politics in the production of a new commodity. *Human Ecology, 40*, 661–664.
McCarthy, J. F. (2010). Processes of inclusion and adverse incorporation: Oil palm and agrarian change in Sumatra, Indonesia. *The Journal of Peasant Studies, 37*, 821–850.
McDermott, M., Mahanty, S., & Schreckenberg, K. (2013). Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services. *Environmental Science & Policy, 33*, 416–427.
Meijaard, E., & Sheil, D. (2019). The moral minefield of ethical oil palm and sustainable development. *Frontiers in Forests and Global Change 2*.
Meyer, C., & Miller, D. (2015). Zero Deforestation Zones: The case for linking deforestation-free supply chain initiatives and jurisdictional REDD+. *Journal of Sustainable Forestry, 34*, 559–580.
Midgley, G. (2000). *Systemic Intervention*. Boston, MA: Springer.
Lomax, T., Kenrick, J., & Brownell, A. (2012). Sime Darby oil palm and rubber plantation in Grand Cape Mount County, Liberia. In: Colchester, M., Chao, S. (Eds.), Conflict or consent? The oil palm sector at a crossroads. Forest Peoples Programme, Moreton-in-Marsh, England, pp. pp 302-331. Available at: https://www.forestpeoples.org/en/topics/palm-oil-rspo/publication/2013/conflict-or-consent-oil-palm-sector-crossroads. Accessed October 2024.
Momoh, H.B., & Browne, A.K. (2019). Terminal evaluation of strengthening conflict prevention through establishing multi-stakeholder platforms and improved alternative livelihoods for concession affected communities project. UNDP, UNFAO, UNPBF and Liberia National Bureau of Concessions, Monrovia, Liberia. Available at: https://www.un.org/peacebuilding/sites/www.un.org.peacebuilding/files/documents/liberia_irf_230_multistakeholder_platforms.pdf. Accessed October 2024.
National Oil Palm Platform of Liberia (2021). National oil palm strategy and action plan of Liberia. Available at: https://www.undp.org/sites/g/files/zskgke326/files/migration/gcp/be61b94ae661f0df17116364d75a35d6beb087ccb9b969cfc878042f101b01a5.pdf. Accessed October 2024.
Newton, P., Agrawal, A., & Wollenberg, L. (2013). Enhancing the sustainability of commodity supply chains in tropical forest and agricultural landscapes. *Global Environmental Change, 23*, 1761–1772.
Niesten, E.T., & Sayon, B. (2020). Targeted Scenario Analysis: Sustainable palm oil concessions in Liberia. UNDP Partnership for Action on Green Economy (PAGE). Available at: https://www.conservation-strategy.org/sites/default/files/field-files/Final%20TSA%20Report%20Liberia.pdf. Accessed October 2024.
Oberlack, C., Tejada, L., Messerli, P., Rist, S., & Giger, M. (2016). Sustainable livelihoods in the global land rush? Archetypes of livelihood vulnerability and sustainability potentials. *Global Environmental Change, 41*, 153–171.
Oberlack, C., Giger, M., Anseeuw, W., Adelle, C., Bourblanc, M., Burnod, P., Eckert, S., Fitawek, W., Fouilleux, E., Hendriks, S. L., Kiteme, B., Masola, L., Mawoko, Z. D., Mercandalli, S., Reys, A., da Silva, M., van der Laan, M., Zaehringer, J. G., & Messerli, P. (2021). Why do large-scale agricultural investments induce different socio-economic, food security, and environmental impacts? Evidence from Kenya, Madagascar, and Mozambique. *Ecology and Society, 26*, 18.
Onwuegbuzie, A. J., & Leech, N. L. (2007). Sampling designs in qualitative research: Making the sampling process more public. *Qualitative Report, 12*, 238–254.
Pendrill, F., Persson, U. M., Godar, J., & Kastner, T. (2019). Deforestation displaced: Trade in forest-risk commodities and the prospects for a global forest transition. *Environmental Research Letters, 14*, Article 055003.
Pesqueira, L., & Glasbergen, P. (2013). Playing the politics of scale: Oxfam's intervention in the Roundtable on Sustainable Palm Oil. *Geoforum, 45*, 296–304.
QSR International. (2021). *NVivo Release v.1.4.1, 851*. QSR International Pty Ltd.
Republic of Liberia (2006). An Act Adopting The National Forestry Reform Law Of 2006. Monrovia, Liberia: Legislature of the Republic of Liberia. Available at: https://www.clientearth.org/latest/documents/act-2006-act-adopting-the-national-forestry-reform-law-liberia/. Accessed October 2024.

Republic of Liberia (2008a). An Act Ratifying the Concession Agreement Between The Republic Of Liberia and LIBINC Oil Palm Inc. Monrovia, Liberia: Legislature of the Republic of Liberia. Available at: https://www.openlandcontracts.org/contract/ocds-591adf-6459881214/view#/pdf. Accessed October 2024.

Republic of Liberia (2008b). Liberia poverty reduction strategy. Monrovia, Liberia: Government of the Republic of Liberia. Available at: https://www.imf.org/external/pubs/ft/scr/2008/cr08219.pdf. Accessed October 2024.

Republic of Liberia (2009). An Act to Ratify the Amended and Restated Concession Agreement Between the Republic of Liberia and Sime Darby Plantation (Liberia) Inc. Monrovia, Liberia: Legislature of the Republic of Liberia. Available at: https://leiti.org.lr/sites/default/files/documents/164828310-sime-darby-liberia-concession-agreement.pdf. Accessed October 2024.

Republic of Liberia (2010). An Act to Ratify the Concession Agreement Between the Republic of Liberia and Golden Veroleum (Liberia) Inc. Monrovia, Liberia: Legislature of the Republic of Liberia. Available at: https://goldenveroleumliberia.com/wp-content/uploads/2010/09/2014-09-30.2_GVL_Concession_Agreement-rev1.pdf. Accessed October 2024.

Republic of Liberia (2011). An Act Enacting the Concession Agreement Between The Government Of Liberia and the Maryland Oil Palm Plantation. Monrovia, Liberia: Legislature of the Republic of Liberia. Available at: https://www.openlandcontracts.org/contract/ocds-591adf-5085611127/download/pdf. Accessed October 2024.

Republic of Liberia (2018a). An Act To Establish The Land Rights Law of 2018, Republic of Liberia. Legislature of the Republic of Liberia, Monrovia, Liberia. Available at: https://faolex.fao.org/docs/pdf/lbr182407.pdf. Accessed October 2024.

Republic of Liberia (2018b). Pro Poor Agenda for Prosperity and Development (PAPD): A Five-Year National Development Plan Towards Accelerated, Inclusive and Sustainable Development. Monrovia, Liberia: Government of Liberia. Available at: https://faolex.fao.org/docs/pdf/lbr204464.pdf. Accessed October 2024.

Republic of Liberia (2019). Development of National Guidelines on Free, Prior, and Informed Consent (FPIC). Monrovia, Liberia: Environment Protection Agency, Forestry Development Authority, & World Bank. Available at: https://ekmsliberia.info/wp-content/uploads/2021/08/D7-Final-Report_compressed.pdf. Accessed October 2024.

Republic of Liberia (2021). Liberia National Forest Inventory 2018/2019. Monrovia, Liberia: Forestry Development Authority. Available at: https://www.forestcarbonpartnership.org/system/files/documents/Liberia%20National%20Forest%20Inventory.pdf. Accessed October 2024.

Richards, P., Archibald, S., Bruce, B., Modad, W., Mulbah, E., Varpilah, T., & Vincent, J. (2005). Community cohesion in Liberia: A post-war rapid social assessment. *Social Development Papers Conflict, Prevention & Reconstruction Paper, 21*.

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology, 11*, 25–41.

Ros-Tonen, M. A. F., Bitzer, V., Laven, A., Ollivier de Leth, D., Van Leynseele, Y., & Vos, A. (2019). Conceptualizing inclusiveness of smallholder value chain integration. *Current Opinion in Environmental Sustainability, 41*, 10–17.

Rosoman, G., Sheun, S. S., Opal, C., Anderson, P., & Trapshah, R., editors, (2017) The HCS Approach Toolkit Version 2.0. Singapore: The HCSA Foundation. Available at: https://highcarbonstock.org/toolkit/. Accessed October 2024.

RSPO (2011). Complaint about SD GUTHRIE BERHAD submitted by Forest Peoples Programme (FPP). Available at: https://rspo.my.site.com/Complaint/s/case/50090000028Es02AAC/detail. Accessed October 2024.

RSPO (2012). Complaint about Golden Veroleum (Liberia) Inc. (GVL) submitted by Green Advocates on behalf of the communities of in Greenville, Butaw, & Kpanyan Districts of Sinoe County. Forest Peoples Programme, Sustainable Development Institute Liberia. Kulu United Development Association. Available at: https://rspo.my.site.com/Complaint/s/case/50090000028ErzuAAC/detail. Accessed October 2024.

RSPO (2013). Complaint about Equatorial Palm Oil Plc (a subsidiary of Kuala Lumpur Kepong Berhad) (Respondent) submitted by the Sustainable Development Institute. Available at: https://rspo.my.site.com/Complaint/s/case/50090000028Es0OAAS/detail. Accessed October 2024.

RSPO (2018). Principles & Criteria For the Production of Sustainable Palm Oil 2018. Malaysia: RSPO: Kuala Lumpur. Available at: https://rspo.org/resources/?id=6025. Accessed October 2024.

RSPO (2021a). Liberia National Interpretation of RSPO Principles & Criteria for the Production of Sustainable Palm Oil 2018. Available at: https://rspo.org/wp-content/uploads/liberia-ni-june-2021.pdf. Accessed October 2024.

RSPO (2021b). No Deforestation Joint Steering Group (NDJSG) Call 5 Meeting Notes, Kuala Lumpur, Malaysia. Available at: https://rspo.org/resources/?category=meeting-minutes-no-deforestation-joint-steering-group. Accessed October 2024.

RSPO (2023) No Deforestation Joint Steering Group (NDJSG) Call 7 (7 April 2022) Meeting notes.Available at: https://rspo.org/resources/?category=meeting-minutes-no-deforestation-joint-steering-group. Accessed October 2024.

RSPO (2024). Members. Kuala Lumpur, Malaysia: RSPO. Available at: https://rspo.org/search-members/. Accessed October 2024.

Sannier, C., McRoberts, R. E., Fichet, L.-V., & Makaga, E. M. K. (2014). Using the regression estimator with Landsat data to estimate proportion forest cover and net proportion deforestation in Gabon. *Remote Sensing of Environment, 151*, 138–148.

Santika, T., Wilson, K. A., Budiharta, S., Law, E. A., Poh, T. M., Ancrenaz, M., Struebig, M. J., & Meijaard, E. (2019). Does oil palm agriculture help alleviate poverty? A multidimensional counterfactual assessment of oil palm development in Indonesia. *World Development, 120*, 105–117.

Santika, T., Wilson, K. A., Law, E. A., St John, F. A. V., Carlson, K. M., Gibbs, H., Morgans, C. L., Ancrenaz, M., Meijaard, E., & Struebig, M. J. (2021). Impact of palm oil sustainability certification on village well-being and poverty in Indonesia. *Nature Sustainability, 4*, 109–119.

Schouten, G., & Glasbergen, P. (2011). Creating legitimacy in global private governance: The case of the Roundtable on Sustainable Palm Oil. *Ecological Economics, 70*, 1891–1899.

SIFCA (2016). Rapport developpement durable 2016. Available at: https://groupesifca.com/wp-content/uploads/2022/07/rapport-dd-sifca-2016.pdf. Accessed October 2024.

Sime Darby (2011) Annual Report. Selangor, Malaysia: Sime Darby. Available at: https://www.simedarby.com/sites/default/files/annualreport-pdf/sime_darby_annual_report_2011.pdf. Accessed October 2024.

Sime Darby Plantation (2014a). Sime Darby Plantation Halts All Development while HCS Study is Conducted. Available at: https://www.sdguthrie.com/sime-darby-plantation-halts-all-development-while-hcs-study-is-conducted/. Accessed October 2024.

Sime Darby Plantation (2014b). Sustainability Report 2014. Selangor, Malaysia: Sime Darby Plantation. Available at: https://www.simedarbyplantation.com/sites/default/files/sustainability/sime-darby-plantation-sustainability-report-2014.pdf. Accessed May 2021.

Sime Darby Plantation (2016). Innovating for the Future: Sustainability Report 2016. Selangor, Malaysia: Sime Darby Plantation Berhad. Available at: https://www.simedarbyplantation.com/sites/default/files/sustainability/SimeDarby%20Plantation_SR2017_dec2016.pdf. Accessed May 2021.

Sime Darby Plantation (2019). Raising the Bar on Sustainable Growth: Sustainability Report 2019. Selangor, Malaysia: Sime Darby Plantation Berhad. Available at: https://www.simedarbyplantation.com/sites/default/files/Sime%20Darby%20Plantation%20Berhad%20Sustainability%20Report%202019.pdf. Accessed May 2021.

Stevens, C. J. (2014). The legal history of public land in Liberia. *Journal of African Law, 58*, 250–265.

Ulrich, W. (1983). *Critical heuristics of social planning: A new approach to practical philosophy*. Chichester, England: John Wiley & Sons.

Ulrich, W., & Reynolds, M. (2020). Critical Systems Heuristics: The idea and practice of boundary critique. In M. Reynolds, & S. Holwell (Eds.), *Systems Approaches to Making Change: A Practical Guide, 2nd* (Edition ed., pp. 255–306). London: Springer.

UNDP (2018). Good Growth Partnership Year One Highlights 2018. New York, NY: UNDP. Available at: https://goodgrowthpartnership.com/wp-content/uploads/Good-Growth-Partnership-Highlights-Year-One.pdf. Accessed October 2024.

UNDP (2019). Good Growth Partnership Year Two Highlights 2019. New York, NY: UNDP. Available at: https://www.undp.org/publications/good-growth-partnership-year-two-highlights-2019. Accessed October 2024.

UNDP (2021). Good Growth Partnership Year Four Highlights 2021. New York, NY: UNDP. Available at: https://goodgrowthpartnership.com/wp-content/uploads/Year-four-highlights-of-the-Good-Growth-Partnership.pdf. Accessed October 2024.

UNDP (2024) Human Development Index (HDI) Dataset. Available at: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI. Accessed October 2024.

van der Werf, G. R., Morton, D. C., DeFries, R. S., Olivier, J. G. J., Kasibhatla, P. S., Jackson, R. B., Collatz, G. J., & Randerson, J. T. (2009). CO2 emissions from forest loss. *Nature Geoscience, 2*, 737.

van Heist, M., Liswanti, N., Boissière, M., Padmanaba, M., Basuki, I., & Sheil, D. (2015). Exploring local perspectives for conservation planning: A case study from a remote forest community in Indonesian Papua. *Forests, 6*, 3278–3303.

Vicol, M., Neilson, J., Hartatri, D. F. S., & Cooper, P. (2018). Upgrading for whom? Relationship coffee, value chain interventions and rural development in Indonesia. *World Development, 110*, 26–37.

von Essen, M., & Lambin, E. F. (2021). Jurisdictional approaches to sustainable resource use. *Frontiers in Ecology and the Environment, 19*, 159–167.

Watson, J. E. M., Evans, T., Venter, O., Williams, B., Tulloch, A., Stewart, C., Thompson, I., Ray, J. C., Murray, K., Salazar, A., McAlpine, C., Potapov, P., Walston, J., Robinson, J. G., Painter, M., Wilkie, D., Filardi, C., Laurance, W. F., Houghton, R. A., Maxwell, S., Grantham, H., Samper, C., Wang, S., Laestadius, L., Runting, R. K., Silva-Chávez, G. A., Ervin, J., & Lindenmayer, D. (2018). The exceptional value of intact forest ecosystems. *Nature Ecology & Evolution, 2*, 599–610.

Werker, E., & Pritchett, L. (2017). *Deals and development in a resource-dependent, fragile state: The political economy of growth in Liberia, 1960–2014, Deals and Development*. Oxford: Oxford University Press.

World Bank (2021a). Country Profile: Gabon, World Development Indicators database. Washington, DC: World Bank. Available at: https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=GAB. Accessed July 2021.

World Bank (2021b). Country Profile: Liberia, World Development Indicators database. Washington, DC: World Bank. Available at: https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=LBR. Accessed August 2021.

ZSL (2024). SPOTT Palm oil: ESG policy transparency assessments. The Zoological Society of London, London, UK. Available at: https://www.spott.org/palm-oil/. Accessed October 2024.