Understanding Zero Deforestation and the High Carbon Stock Approach in a highly forested tropical country

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Abstract

“Zero deforestation” commitments are pledges by companies to avoid deforestation when producing palm oil. Zero deforestation can be implemented using the High Carbon Stock Approach (HCSA), a tool that distinguishes forests from degraded land which can be developed. In highly forested countries like Gabon, zero deforestation may conflict with national economic goals involving palm oil and other agricultural commodities. We investigated perspectives of stakeholders in Gabon about zero deforestation and the HCSA using Critical Systems Heuristics, a systems thinking methodology. In 25 interviews with government, NGOs, companies, and research institutions, and two focus groups with rural communities, we identified three contrasting perspectives on forest conservation and agro-industrial development: international, national, and local. Zero deforestation represents an international perspective that marginalises issues from a national perspective. This may produce unintended consequences that undermine the legitimacy of zero deforestation, including conversion of Gabon’s savannahs and disincentives for sustainable business. From a local perspective, zero deforestation is embedded in an agro-industrial vision that may marginalise value judgments concerning forests and traditional livelihoods. Gabon’s National Land Use Plan could help reconcile the three perspectives but requires recognition

by international standards. Adapting the HCSA to Gabon's context should also be considered to promote legitimacy. Research is required to ensure proposed institutional arrangements deliver equitable multi-stakeholder participation in land-use planning. Gabon's case shows the applicability of zero deforestation to all highly forested countries cannot be assumed. Improved international understanding of national contexts, and flexibility in applying "zero deforestation", is important for designing effective and equitable international standards for sustainable agricultural production.

1.0 Introduction

Global demand for agricultural commodities including palm oil has been associated with deforestation, biodiversity loss, and greenhouse gas emissions across the tropics (Meijaard et al., 2018; Pendrill et al., 2019). In response, private-sector initiatives have been established to eliminate deforestation from agricultural commodity supply chains (Lambin et al., 2018). These include the Roundtable on Sustainable Palm Oil (RSPO), which sets a voluntary international standard for sustainable palm oil production (Nikoloyuk et al., 2010). Under pressure from non-government organisations (NGOs) including Greenpeace (2007), dozens of companies also adopted commitments to "zero deforestation" in their operations and supply chains (Rothrock et al., 2019).

RSPO certification is used by companies to implement zero deforestation commitments in the palm oil sector (Garrett et al., 2019). Until 2018, however, the RSPO standard did not guarantee zero deforestation, because it permitted clearing of logged or degraded forests outside riparian or High Conservation Value (HCV) areas (Carlson et al., 2018). In 2018, the RSPO adopted zero deforestation by requiring use of the High Carbon Stock Approach (HCSA) Toolkit (RSPO, 2018b). The HCSA distinguishes "High Carbon Stock" (HCS) forests from degraded areas that can be developed (Rosoman et al., 2017). Vegetated areas that meet the HCSA definition of "young regenerating forest" or more mature forest cannot be cleared, although leeway is permitted for young regenerating forest patches <100 ha.

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59 The HCSA was developed for fragmented forest landscapes in Indonesia and Malaysia
60 (Rosoman et al., 2017), where remnant forest patches with low carbon stocks retain high
61 biodiversity value (Deere et al., 2017). The relationship between biodiversity and carbon
62 stocks is less clear for intact, old-growth forests in Africa (Sullivan et al., 2017). The strict
63 application of zero deforestation through the HCSA in countries with high forest cover may
64 also restrict agricultural expansion and conflict with economic development goals (Lyons-
65 White et al., 2020). As the RSPO standard applies equally in countries with fragmented
66 forests and countries with high forest cover, the application of zero deforestation and the
67 HCSA in highly forested countries has become the subject of debate (Senior, 2018).

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69 The Republic of Gabon in Central Africa is among the most highly forested countries in the
70 world, with 88% forest cover (Sannier et al., 2014). Gabon's forests are protected by national
71 legislation including the Forest Code (2001), which regulates forest access, use, and
72 management, and the National Park Law (2007), which governs 13 national parks covering
73 11% (3.0 Mha) of Gabon's territory (Mikolo Yobo and Ito, 2016). Gabon is also committed to
74 reducing greenhouse gas emissions by 50% by 2025 under the Paris Agreement (2015).
75 Due to the declining production of petroleum, Gabon's primary export, the government has
76 targeted industrial agriculture to diversify the national economy (République Gabonaise,
77 2012). Gabon's national development plan targeted 425,000 tonnes of palm oil production
78 per year by 2025 (République Gabonaise, 2015b) and initiated a National Land Use Plan
79 (NLUP) to optimally allocate areas to economic production or conservation (Lee, 2014).
80 Gabon's national partner in oil palm development is Olam International, a multinational
81 agribusiness headquartered in Singapore. Olam has planted 63,000 ha oil palm and
82 produced 55,000 tonnes of palm oil in Gabon in 2019 (Olam International, 2019). As an
83 RSPO member with a "no deforestation" commitment, Olam is bound by the RSPO's HCSA
84 requirements.

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In total, 87% of Gabon is covered by forest with carbon stocks over 75 tonnes carbon ha⁻¹ (tCha⁻¹), and 80% over 118 tCha⁻¹, the national average for secondary forests (Austin et al., 2017). This implies the availability of 1.2–1.7 Mha of non-HCV and non-HCS land suitable for oil palm, based on an HCS threshold of 75–118 tCha⁻¹, which would protect 93–99% of Gabon’s carbon stocks. A study of carbon emissions from oil palm development in Gabon recommended restricting conversion to areas under 108–118 tCha⁻¹, subject to the conservation of set-aside areas to offset greenhouse gas emissions (Burton et al., 2017). These thresholds are higher than the 35–75 tCha⁻¹ for young regenerating forest specified by the HCSA (Rosoman et al., 2017). Although the HCSA permits regional validation of quantitative indicator thresholds, the requirement to conserve young regenerating forest is fixed. Thus, the HCSA could limit available land for RSPO-certified oil palm development in Gabon, if applied without adaptation.

The HCSA Steering Group (2018) has ruled out adapting the HCSA for high forest cover landscapes. The RSPO and HCSA Steering Group established a “No Deforestation Joint Steering Group” to develop procedures for implementing the 2018 RSPO standard (including the HCSA) in high forest cover countries. This covers development pathways chosen by communities or indigenous groups, rather than company-led oil palm development (RSPO, 2019). A National Interpretation of the RSPO standard for Gabon noted the development of a national HCS methodology, but still requires the HCSA Toolkit (RSPO, 2020b).

Consequently, the potential impacts of zero deforestation and the HCSA on Gabon’s agro-industrial development plans remain unclear. In light of the ongoing debate about forest definitions and zero deforestation, Gabon postponed signing the Marrakesh Declaration for Sustainable Development of the Oil Palm Sector in Africa, which committed signatories to zero deforestation (CAFI, 2020).

The high stakes associated with zero deforestation in highly forested countries demand engagement with diverse stakeholder perspectives. Research on perspectives in Liberia

found the HCSA can marginalise rural valuations of land and forest (Cheyins et al., 2019), but did not investigate issues arising specifically from Liberia’s highly forested context. Perspectives on “deforestation-free” in Central Africa were explored in a multi-stakeholder meeting in Gabon in 2017 (Taylor et al., 2017) and in a consulting report for RSPO (Senior, 2018). However, a systematic empirical assessment of perspectives on zero deforestation and the HCSA in a highly forested country is yet to be conducted.

Here, we explored the perspectives of stakeholders in Gabon using Critical Systems Heuristics, a systems thinking methodology novel to tropical forest conservation. Our aims were to 1) develop a systemic understanding of stakeholders’ perspectives on zero deforestation and the HCSA, and Gabon’s emerging palm oil sector; and 2) develop recommendations for international stakeholders including RSPO, and national stakeholders including government, to inform the effective and equitable implementation of zero deforestation in Gabon.

2.0 Methodology, Materials, and Methods

2.1 Methodology

In Critical Systems Heuristics (CSH; Ulrich, 1983), “systems” are viewed as conceptual devices which can be used to understand and positively transform problematic situations (Ulrich and Reynolds, 2010). Using systems involves making “boundary judgments” about what elements are part of a system or part of its environment. Boundary judgments thus result in “reference systems” that are selective, partial conceptions of a situation (Ulrich, 2000). Asking stakeholders about their boundary judgments can help “unfold” their perspectives on a situation. CSH defines 12 categories of boundary judgment, with 12 pre-defined “boundary questions” to identify them (**Table 1**). Stakeholders can be asked each question in an “actual” mode (“What is?”) and an “ideal” mode (“What ought to be?”). The core activity of CSH, “boundary critique”, involves questioning the relevance, justification, and ethical defensibility of stakeholders’ boundary judgments (Ulrich and Reynolds, 2010).

CSH can thus be used to explore and critique multiple stakeholders' perspectives on a situation, promoting mutual understanding and revealing options for positive change.

Table 1. Critical System Heuristics boundary categories and questions, grouped by four possible "sources of influence" on a situation. Key stakeholder groups are defined by "Social Roles". Here, our Results are organised using the boundary categories as follows: Decision Environment (6) is presented first to provide context, followed by "Sources of Motivation" in the order recommended by Ulrich and Reynolds (2010) (2, 1, 3); remaining boundary categories are presented sequentially (4, 5; 7, 8, 9; 10, 11, 12). Table adapted from Ulrich and Reynolds (2010).

Sources of influence	Boundary Judgments		
	<i>Social Roles</i>	<i>Specific Concerns (Stakes)</i>	<i>Key Problems (Stakeholding Issues)</i>
Sources of Motivation	<i>1. Beneficiary</i> Who is/ought to be beneficiary of the system?	<i>2. Purpose</i> What is/ought to be the purpose of the system?	<i>3. Measure of improvement</i> What is/ought to be the measure of success of the system?
Sources of Control	<i>4. Decision-maker</i> Who is/ought to be the decision-maker for the system?	<i>5. Resources</i> What components of the system are/ought to be controlled by the decision-maker?	<i>6. Decision environment</i> What is the decision environment? What conditions and resources are not/ought not to be controlled by the decision-maker?
Sources of Knowledge	<i>7. Expert</i> Who is/ought to be providing relevant knowledge and skills for the system? Who is/ought to be involved with designing it?	<i>8. Expertise</i> What is/ought to be relevant new knowledge and skills for designing or using the system?	<i>9. Guarantor</i> Who is/ought to be the guarantor of the system?
Sources of Legitimacy	<i>10. Witness</i> Who among those affected by the system is/ought to get involved with it? Who does/ought to represent the interests of those affected by the system?	<i>11. Emancipation</i> What are/ought to be the opportunities for the interests of those negatively affected to have expression and freedom from the worldview of the system?	<i>12. Worldview</i> Upon what world views is/ought the design of the system to be based? How are/ought these world views to be reconciled?

Here, we used CSH in a *post hoc*, reflective mode (after Reynolds, 1998) to explore stakeholders' perspectives on zero deforestation and the HCSA, and evaluate their use in Gabon. CSH was selected for three reasons. First, systems thinking is useful for exploring complex social-ecological problems characterised by divergent perspectives, flexible boundary judgments, and multiple interrelationships (Knight et al., 2019). Second, CSH provides a structured framework for unfolding multiple perspectives (Ulrich and Reynolds, 2010). Third, CSH addresses power issues by examining stakeholder marginalisation and legitimacy through the boundary categories (Ulrich, 2000). This was useful as the HCSA stands to affect highly forested African countries, such as Gabon, that are poorly represented in the RSPO and HCSA Steering Group.

2.2 Materials

2.2.1 Study Sites

Gabon was selected as a case country, having been defined as one of seven “high forest cover countries” by RSPO (RSPO, 2018a), and because its palm oil production is controlled by two RSPO members (Olam and SOTRADER, a public-private partnership between the Government of Gabon and Olam). The study sites were Libreville (Estuaire Province), Gabon's administrative capital; and Mouila (Ngounié Province), the site of one of Olam's oil palm concessions.

2.2.2 Initial reference system and interview guide

Following Ulrich and Reynolds (2010), the lead author (J.L.W.) defined his personal “reference system” (**Supplementary Table**) at the study outset using the boundary questions to make his subjective standpoint transparent (after Clark, 2002) and establish a starting point to explore contrasting perspectives. An interview guide was developed using the CSH boundary questions and trialled in three interviews with readily-accessible members of an NGO in August 2018 to practice using the boundary questions. An adapted version was developed for rural communities to accommodate potentially lower familiarity with the

zero deforestation and HCS concepts. The interview guide was refined throughout the study to ensure sensitivity to emerging themes and as competence with the boundary questions developed (Brinkmann and Kvale, 2015).

2.3 Methods

2.3.1 Sampling

Purposive sampling was used to recruit participants from stakeholder groups involved with, or affected by, forest conservation and agro-industry in Gabon (Robinson, 2014). Groups were identified by cross-tabulating sustainable commodity supply chain actors (Newton et al., 2013) with four social roles defined by CSH (**Table 1**). Six groups were identified: government; International NGOs (INGOs) operating in Gabon; Gabonese National NGOs (NNGOs); agricultural (agribusiness) and forestry companies; rural communities; and research institutions. Other inclusion criteria specified individuals over 18 years of age and either located in Gabon during fieldwork or representing ongoing business or government activities in Gabon. Recruitment targets comprised at least three participants in each group (Onwuegbuzie and Leech, 2007), notwithstanding overlaps (e.g. between government and research institutions) and the potential need for a larger sample to include key stakeholders in the problem situation.

2.3.2 Fieldwork

Fieldwork was conducted in Libreville and Mouila in October–November 2018. Interviews were conducted in English, or with an interpreter in French or the local languages of Apindji or Guisir. All interviews secured participant consent and were audio-recorded or, where participants withheld consent for audio-recording, recorded by hand. Detailed fieldnotes were made.

2.3.3 Boundary Critique

Analysis consisted of boundary critique, a highly-structured, subjective method that ensures development of a nuanced, systemic understanding of complex systems not afforded by quantitative methodologies. Interview recordings and notes were transcribed and translated into English. Transcripts were coded in NVivo 12 Plus (QSR International, 2019) using the CSH boundary questions as a coding framework. Notes were taken throughout coding to record emerging critiques and conflicts (Ulrich and Reynolds, 2010). Throughout coding, individual participants' reference systems were mapped in both actual (is) and ideal (ought) modes. These were used to develop a pair of summary "maps" (actual and ideal), with boundary judgments organised by stakeholder group. Contrasting boundary judgments were identified and critiqued concerning their relevance, justification, and ethical defensibility, and used to develop an overall reference system. This took the form of a narrative synthesis, structured by the boundary categories. The final reference system was developed through repeated redrafting while referring to the original data and notes on emerging critiques and conflicts (Van Manen, 2016). The draft study report (and Executive Summary; **Supplementary Information**) was shared with participants and comments were addressed.

2.4 Ethics

All participants were provided with a participant information sheet and gave their written informed consent before participating in the study. Interviews were conducted under condition of confidentiality. Ethical approval was given by the Imperial College Joint Research Compliance Office (JRCO). Permission to conduct the research was given by The National Centre for Scientific Research and Technology (CENAREST).

3.0 Results

In total, 25 semi-structured interviews (mean: 61 minutes; range: 35–100 minutes) were conducted with participants representing 17 organisations (**Table 2**). For rural communities, a pair of focus groups was conducted (with three and four participants) rather than interviews, as this was the communities' preference and it was deemed important to include

the views of these potentially-marginalised groups. Results are presented as a reference system organised using the CSH boundary categories (**Table 1** legend), supported by illustrative quotations (**Table 3**). To preserve anonymity, no participant identifiers are presented.

Table 2. Summary of interviews (n=25), participants' organisations (n=17) and stakeholder groups, and two focus groups with rural communities. Companies included two agribusiness and two forestry companies. NR: Not audio recorded (n=3).

Government		International NGOs		National NGOs	
Organisation	Interviews (n)	Organisation	Interviews (n)	Organisation	Interviews (n)
1	4 (NR x1)	5	1	8	1
2	1 (NR)	6	2	9	1
3	1	7	1	10	2
4	1			11	1 (NR)
n=4	n=7	n=3	n=4	n=4	n=5
Companies		Research Institutions		Rural Communities	
Organisation	Interviews (n)	Organisation	Interviews (n)	Community	Focus groups (n)
12	4	16	1	1	1 (3 participants)
13	1	17	1	2	1 (4 participants)
14	1				
15	1				
n=4	n=7	n=2	n=2	n=2	n=2 (7 participants)

3.1 Reference System

3.1.1 What is the Decision Environment concerning zero deforestation and the HCSA?

Government officials reported that Gabon is committed to conserving forests and tackling climate change. Other participants claimed national environmental safeguards are undermined by: inadequate application of the law and underfunded enforcement; legal non-compliance by logging and agricultural companies; insufficient recognition of customary or indigenous rights; and poor inter-ministry coordination, including issuance of overlapping agricultural, logging, and mining permits.

Economic development is a government priority to alleviate poverty, provide food security, and diversify the economy. Agro-industry, including palm oil, was viewed by government,

agribusinesses, and some NGOs as important for Gabon's socio-economic development (**Table 3A**). For oil palm cultivation, agribusiness representatives reported that previously forested areas are preferable to savannahs, where soil quality is poorer and water is less accessible. This necessitates irrigation, increased fertiliser use, and higher investment. NGOs contested the value of palm oil for alleviating poverty or improving food security, given Gabon's failure to redistribute profits from petroleum, and considering that palm oil is more likely to serve export biofuel markets than domestic food requirements (**Table 3B**). Concerns about the benefits of palm oil for rural development were shared by the community participants, who were critical of Olam's operations and claimed traditional livelihood practices had been impaired, while living standards had not improved as expected (**Table 3C**).

3.1.2 What is, or ought to be, the Purpose of zero deforestation and the HCSA?

Participants agreed that zero deforestation should protect forests and minimise the negative environmental impacts of economic development. However, views about the precise purpose of zero deforestation depended on how "forest" was conceived and defined (**Box 1**). Interpretations of the meaning of "zero deforestation" included: not cutting a single tree; practising agroforestry; using savannah for agriculture; and zero net deforestation (deforestation offset by tree replanting or regeneration). Participants were concerned about zero deforestation meaning not a single tree should be cut, as this was viewed as impossible, and even frightening, for Gabon's development (**Table 3D**).

As voluntary corporate policies, zero deforestation and the HCSA were viewed by some agribusiness representatives as being derived from the need to ensure business sustainability and meet customers' demands. As such, their purpose could appear to be limited to the private sector, and agro-industry in particular. However, participants from government, NGOs, and research institutions were concerned about the broader implications of zero deforestation and the HCSA for Gabon's economy, especially if adopted

284 by certification schemes in additional sectors beyond agro-industry. This implied zero
285 deforestation and the HCSA should be examined in the broader context of Gabon's
286 economic development. Some participants from government, INGOs, and companies
287 regarded some deforestation as inevitable and advocated careful land-use planning rather
288 than zero deforestation (**Table 3E**).

Box 1. Conceptions of “forest” in Gabon

Government, agribusiness, NNGOs and communities described two major forest classes in Gabon: *petites forêts* (small forests; in Apindji, “*poto*”); and *grandes forêts* (big forests; in Apindji, “*conga*”). Villages were historically moved from within forests to roadsides by the French colonial policy of *regroupement*, and forests were primarily described in terms of their spatial relation or distance to roads and villages (A). Near villages (100 m – 3 km), there are active and fallow agricultural areas (B). Fallows are characterised by pioneer tree species such as *parasolier* (*Musanga cecropioides*; C), but may also possess commercially-important species such as Okoumé (*Aucoumea klaineana*). Further from villages (3–4 km) are *petites forêts*: secondary forests with evidence of human activity (D). Communities described *petites forêts* as being easily accessible and providing agricultural land and medicinal plants, but requiring traps for hunting due to human activity disturbing wildlife.

Further from villages (10–20 km) are *grandes forêts*, described by government, agribusiness and NNGOs as mature forests (E). Communities described *grandes forêts* as having big trees and animals, open understory which can be traversed without a machete, and no evidence of human activity for >20 years. In addition to these spatial descriptions, communities described forests as “*divine places*” from which “*islands*” were traditionally taken for cultivation. Hence, forests were not only conceptualised by their spatial relationship to roads and villages (this conceptualisation may have resulted from *regroupement*). Forests were distinguished from savannahs (F), which were characterised by few trees except alongside rivers.

Photographs by J.L.W.

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291 *3.1.3 Who are, or ought to be, the Beneficiaries of zero deforestation and the HCSA?*

292 Participants across stakeholder groups thought the beneficiaries of zero deforestation should
293 be current and future generations of Gabonese people. This was linked to forests'
294 importance for rural livelihoods, and the belief that communities should be rewarded for
295 conserving Gabon's forests in the past (**Table 3F**). In practice, zero deforestation was seen
296 as benefitting the international community by mitigating climate change. Some government
297 and NNGO participants thought more-developed countries want African countries to store
298 carbon on their behalf. Some government and agribusiness representatives claimed the
299 HCSA benefits Indonesia and Malaysia, which have undertaken extensive deforestation and
300 do not require more deforestation for palm oil production. Agribusiness and government
301 participants were also concerned that international demands for zero deforestation, and
302 constraints on oil palm expansion, may be driven by competitor oilseed industries, such as
303 soy, which are threatened by palm oil's superior productivity and profitability (**Table 3G**). In
304 the context of weak law enforcement and the voluntary nature of zero deforestation
305 commitments, one smaller forestry company feared that unscrupulous competitors stand to
306 benefit by flouting environmental standards.

307

308 **Table 3.** Participant quotations. Quotations are illustrative of the perspectives identified but
 309 not necessarily representative of participant populations, and must be interpreted with
 310 reference to the broader Results and Discussion.

- A)** *"Agriculture has been designated as the solution to socio-economical challenges in Gabon."* (Government Representative)
- B)** *"I think that the big projects for nutrition are important... We don't need the agriculture project to develop biofuel."* (National NGO Representative)
- C)** *"We thought that Olam's arrival would boost the development of this village but unfortunately the people have realized that nothing has changed."* (Community Member)
- D)** *"Whenever you talk about the concept of zero deforestation in Gabon, everyone wonders what on Earth you are talking about because Gabon is so highly forested that even the city Libreville touches the forests."* (International NGO Representative)
- E)** *"We are a developing country, and we actually need, you know, to have access to some basics. So, then it will be, necessarily, some deforestation."* (International NGO Representative)
- F)** *"Communities' agricultural techniques have contributed to the preservation of the forest and its diversity. Therefore, they should benefit from the HCS, as they live next to the forest."* (National NGO Representative)
- G)** *"All the European oil traders and oil planters in Europe, who don't want to see another oil coming on the market... All these attacks. It just a problem of money. I think so. I don't think that the palm oil is worse than the others. But it's less expensive; it's cheaper."* (Government Representative)
- H)** *"The ideal path is that we do not deforest. That's the ideal path. But knowing that there are imperatives to develop, deforestation will happen. But how to restrict that deforestation so it is the least harmful possible and that it benefits all the actors."* (National NGO Representative)
- I)** *"A country can make its own path. The way chosen by Gabon to reduce its emissions is the National Land-Use Plan. If HCS does not fit into the Plan, it is pff... It will die in this country."* (Government Representative)
- J)** *"We would adopt a carbon threshold of 118 tonnes, which is the average for a secondary forest in Gabon and is less than the confidence limits on carbon stock for intact forest, including logged forest. So, we're tending towards saying that young-to-medium secondary forests, we actually probably wouldn't call them forest anymore. We'll call them farmland or bush or agricultural mosaics or something."* (Government Representative)
- K)** *"Too big trees – 70 cm of diameter, five trees of more than 70 cm is forest, under that, it's not forest? Five trees per hectare more than 70 cm of diameter... It's wrong... Lots of forest stands under this threshold which has good, real potential, future potential forest."* (Forestry Company Representative)
- L)** *"There are very technical aspects that need be comprehended by the population. This means that awareness needs to be raised on this matter... When new themes, new notions like this arrive we need to share, communicate, spread awareness and inform the communities that because after this we can also work on the intellectual level, the education level."* (National NGO Representative)

M) *"If Gabon can say it has done its studies, very precise studies based on field-level data, it can prove that it demonstrates what is going on in the field – it just needs to be listened to."* (Government Representative)

N) *"We are forced to use the little land that Olam has left us. The women use it for plantations. We have no choice. We have to limit ourselves to what they have left us."* (Community Member)

O) *"Us scientists and decision-makers have the same approach to local communities that our colleagues in Europe have towards us. We make decisions and then 2, 3 months later we go and tell the local communities what to do, when it is too late for them to be involved and develop an understanding."* (Government Representative)

P) *"Africa is being sacrificed to correct mistakes made in Europe and America."* (Forestry Company Representative); *"Zero deforestation" is set up for countries which have already devastated their forest, right?"* (Researcher)

Q) *"The government also needs to understand that there is, let's say some rules, or some standards, to respect, if they want to comply. And you cannot just say no, we are an independent, sovereign country."* (Agribusiness Representative)

R) *"But, as I have said, these concepts should be adapted to Gabon's reality. Directly importing these concepts from a country with a different forest cover and a different flora diversity may push Gabon into choosing a non-sustainable development policy."* (National NGO Representative)

S) *"The big danger of certification systems and standards is to go too far. They shouldn't forget their Principle, which is number 3 in RSPO: commitment to long-term economic and financial viability. Because, if we forget this, there is no reason to speak about the RSPO, because the companies will close. And when a company involved in the RSPO closes, don't think that the palm plantations are going to disappear. Companies who don't care about all this will do their job."* (Agribusiness Representative)

T) *"We have people that we call 'pirates', and they don't respect anything. They are well-known companies sometimes, but because they have bribery, they know those people, they don't fall under the same constraints as us."* (Forestry Company Representative)

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312 3.1.4 What is, or ought to be, the Measure of Improvement for zero deforestation and the
313 HCSA?

314 Discussion about improvement focused on minimising the environmental impacts of

315 economic development, rather than avoiding deforestation altogether (**Table 3H**). Desired

316 measures of improvement included attaining food security, improving wealth distribution, and

317 increasing rural living standards. Nationally, the NLUP was viewed as being essential to

318 ensure *"the best allocation of land that helps to fit all those different values we want to*

319 *protect"* (INGO Representative). Locally, communities wanted deforestation to be stopped,

320 traditional livelihood practices to be preserved, and living standards to be improved. Calls

321 were made for recognition of Gabon's efforts to observe best practice in conservation and

development, using tools such as HCV and Free, Prior and Informed Consent. Forestry and INGO participants claimed existing tools in Gabon should be evaluated and reinforced, rather than replaced with new tools potentially unsuited to Gabon's context.

3.1.5 Who is, or ought to be, the Decision Maker regarding zero deforestation and the HCSA?

Gabon's government was viewed as the ultimate decision-maker regarding land use, forest conservation, and economic development (**Table 3f**). Government power is executed through its departments, located in ministries and other institutions (e.g., the National Parks Agency [French acronym ANPN]). Historically, land and power over land use were not distributed evenly between government ministries due to the legacy of Gabon's first national development plan (1966). This gave primacy to the Ministry of Forests and Ministry of Petroleum and Mining, whose sectors were considered economic priorities over agriculture.

Government, companies, and some NNGOs viewed zero deforestation as being imposed by the Global North. Government participants perceived INGOs as attempting to control Gabon's agro-industrial development by influencing NNGOs and attacking agribusinesses. However, international control over zero deforestation and the HCSA was not always perceived negatively. For example, an agribusiness representative claimed international standards are essential in globalised agricultural systems. Nonetheless, participants across stakeholder groups thought land-use planning should be a participatory, multi-stakeholder process led by Gabon's government.

Agribusinesses perceived RSPO as a rule-maker that customers and financiers required them to comply with. Other stakeholders viewed agribusinesses as powerful agents. One NNGO claimed agribusinesses monopolise land. Communities reported having access to land reduced, and certain activities (e.g., hunting and fishing) controlled or restricted, by Olam's operations. Olam was widely viewed as being influential due to its partnership with

the Government of Gabon (which owns 40% of Olam Palm Gabon) and its prominent role in national institutions such as the *Commission de Normalisation*, a technical subcommittee of the Gabonese Standardisation Agency (French acronym AGANOR) that was developing a national forest definition. A forestry company claimed that developing a forest definition inherently serves agro-industrial interests, rather than forestry, biodiversity, or community interests, because a definition is only required to identify suitable land for agriculture.

3.1.6 What are, or ought to be, the Resources and Conditions of Success for zero deforestation and the HCSA?

Although communities' customary rights to access and use forest resources are enshrined in law (Forest Code [2001], Decree No. 692 [2004]), the state retains property rights over land and has granted concession leases to agribusinesses. This makes community land tenure fragile, and one NNGO considered state control of the land to be problematic. An agribusiness representative claimed to lack complete control over concessions – including conservation areas – as logging or mining permits may be awarded to third parties, allegedly due to corruption or poor coordination between ministries' technical departments.

A perceived condition of success for zero deforestation in Gabon was how “forest” is defined. Government, agribusiness, research, and NGO participants believed the HCSA defines forest in terms of above-ground biomass (AGB) using a threshold of $\geq 35 \text{ tCha}^{-1}$. This threshold was regarded by government, agribusinesses, and some NNGOs as being too low. A threshold of 60 tCha^{-1} , reputedly suggested by researchers from the HCS Science Study (a precursor to the HCSA), was also regarded as too low. The threshold problem was thought to arise from the inappropriate transposition of the HCSA methodology from Indonesia and Malaysia to Gabon, where forest cover and carbon stocks were believed to be higher. Government officials reported that secondary forests in Gabon have a mean AGB of 118 tCha^{-1} , with even “*clearly degraded*” (Government Representative) areas over 75 tCha^{-1} . The HCSA Steering Group's shift from using a threshold based on AGB ($\geq 35 \text{ tCha}^{-1}$) to one

based on vegetation class (young regenerating forest) was viewed as an insufficient solution due to the perceived equivalence of young regenerating forest with low AGB. This implies the HCSA threshold should be raised not only in terms of AGB, but also in terms of vegetation class (**Table 3J**). A threshold of $\geq 118 \text{ tCha}^{-1}$ was proposed by government, agribusinesses, and some INGOs and NNGOs as being more appropriate for Gabon.

Not all participants thought adopting a higher AGB threshold was appropriate. One researcher claimed any threshold would grant equivalence to all areas above it, thereby reducing the value of primary relative to secondary forests, and removing the imperative to avoid selectively logging primary forests. An NNGO was concerned that setting thresholds using scientific criteria alone could harm communities, as locally-important forests may not meet these criteria. A forestry company contested the forest definition being developed by the *Commission de Normalisation* (aligned with 118 tCha^{-1}), which would allow degraded areas to be converted to agriculture, potentially threatening the regeneration of commercially-valuable timber species (**Table 3K**).

3.1.7 Who are, or ought to be, considered Experts on zero deforestation and the HCSA?

Among INGOs, NNGOs and government, it was stated that Gabonese land-use policy should be informed by Gabonese (not foreign) scientists and institutions, such as ANPN and the Gabonese Agency for Space Studies and Observations (French acronym AGEOS). NNGOs were viewed as having expertise in working with rural communities and saw it as their responsibility to raise awareness on zero deforestation and the HCSA (**Table 3L**), but some felt limited by lack of human and financial resources. Agribusinesses viewed trained HCS assessors as vital for HCSA implementation, but in critically short supply in Gabon and Africa generally.

3.1.8 What is, or ought to be, relevant Expertise for using zero deforestation and the HCSA?

Government and NGOs claimed that forest definitions and AGB thresholds should be determined scientifically (**Table 3M**), while a logging company claimed definitions should be informed by expertise in forestry. These views revealed beliefs that knowledge, data and expertise – rather than values – should determine forest definitions.

NGOs, government, and companies felt more scientific knowledge is needed on: land suitability for agriculture; alternatives to agro-industry for economic development; distributions of biomass, biodiversity, HCVs, and community land use; and savannah biodiversity. The Central African Forests Initiative (CAFI), which includes a multi-year assessment of the Congo Basin, was viewed as vital to inform Gabon's NLUP. A government scientist called for research to establish a link between Gabon's carbon stocks and biodiversity, and compare the HCSA with other concepts and methodologies including Gabon's National Resources Inventory, which will quantify national forest biomass and carbon stocks.

3.1.9 What is, or ought to be, the Guarantor of successful use of zero deforestation and the HCSA?

Participants emphasised the importance of effective and equitable political, administrative, and scientific processes to reconcile international demands for zero deforestation with Gabon's national interests. Gabon's NLUP was seen as being particularly important in this respect, and participants from government and NNGOs emphasised the importance of the NLUP process being participatory. However, Gabon's record of participatory policy development was criticised by an INGO as being poor. Improvements to state governance were called for to assure forest conservation. For example, NNGOs called for more proactive agricultural legislation; existing legislation was viewed as having been developed reactively to Olam's growth and thus being weak, and poorly enforced compared to Gabon's Forest Code (2001). A government scientist claimed improved legal protection is needed for Gabon's savannahs. An INGO claimed the HCSA should be incorporated into national

legislation to stop agribusinesses selling to international markets without zero deforestation requirements.

Participants across stakeholder groups agreed that successful implementation of zero deforestation and the HCSA could only be assured if there was sufficient international understanding of Gabon's national context. Effective contextual understanding was viewed as needing to cover: Gabon's biophysical reality; institutions and policies; economy; regional growth; food security; and development alternatives. According to an agribusiness representative, prioritising zero deforestation means "*forgetting*" these contextual factors.

3.1.10 Who is marginalised by zero deforestation or the HCSA? Who should represent marginalised stakeholders' interests?

Rural communities reported being negatively affected by agro-industrial development (**Table 3M**). Some INGOs and government representatives viewed communities as having been marginalised in zero deforestation and HCS policy development (**Table 3O**). NNGOs and communities were concerned about access to forests and resources being restricted by conservation, and the potential for agro-industrial development to be shifted from forests to communities' agricultural lands. On the other hand, it was recognised that zero deforestation could protect forests from agro-industrial development, preserving them for community use. One agribusiness representative claimed policies associated with zero deforestation (e.g., "zero burning") could restrict traditional land-management practices such as burning, which is necessary to maintain savannah ecosystems.

INGOs, government, and companies viewed zero deforestation, a "*purely occidental concept*" (Agribusiness Representative), as affecting Gabon unfairly by hindering its economic development while favouring deforested countries (**Table 3P**). A government scientist described feeling excluded from HCS policy development and said they were only invited to provide token inputs at the end of the HCS Science Study, after meaningful work

was completed. This was perceived to have unfairly disadvantaged Gabon's scientists, hindering their ability to become familiar with the HCS development process and participate equally with researchers from the Global North.

NNGOs saw themselves as representatives of the Gabonese population but reported finding it challenging to fulfill this role due to the complexity of the debate about zero deforestation and HCS. Some agribusiness representatives thought NNGOs were under-represented in the zero deforestation debate. A government official called for RSPO to ensure better representation of Gabonese NNGOs in its membership. Meanwhile, government and company representatives thought government should protect agribusinesses from unfounded or unjustified NGO criticism, for fear it might cause companies to withdraw from Gabon, ending beneficial jobs and investment.

3.1.11 Where should the use of zero deforestation and the HCSA in Gabon derive Legitimacy?

Particularly among government participants, Gabon's sovereignty was viewed as being supreme. However, other stakeholder groups claimed Gabon's sovereignty should not be allowed to trump global conservation standards (**Table 3Q**). Still, participants broadly agreed that the use of zero deforestation in Gabon must be consensual and Gabon's government should be involved in decisions about HCS thresholds.

The idea of adapting zero deforestation and the HCSA to Gabon's national context to legitimise their use was discussed extensively, but participants differed on what "contextual adaptation" should mean. In the case of the HCSA, discussion focused on adjusting AGB thresholds, but some participants thought the HCSA methodology should be redeveloped in Gabon. Other participants advocated the development of a new, bespoke national system. Government and NGOs claimed failure to adapt zero deforestation and the HCSA could threaten their adoption, and that of RSPO certification, while excessively strict international

standards could cause Gabon to diverge from sustainable development altogether (**Table 3R**).

If zero deforestation inhibits agro-industrial development, government, agribusiness, and research institution participants felt alternatives for economic development must be found. Agribusiness representatives thought plantations could be expanded without deforestation by converting savannahs. However, this could harm savannah biodiversity and increase pollution due to increased agricultural inputs, which an NNGO claimed affected local water sources, and a community feared might damage subsistence crops. Some NGOs claimed alternatives to oil palm monoculture, such as agroforestry and multiple-use landscapes, could offer superior outcomes in terms of food security, livelihoods, and human development, but have not been sufficiently explored by government. Companies, government, and researchers disputed one NNGO's proposition that ecotourism represents a viable alternative for Gabon's economic development.

Agribusinesses were anxious that standards such as RSPO should not go "too far" with requirements such as the HCSA (**Table 3S**). Should the cost of implementing strict environmental standards make business unviable, companies claimed less scrupulous firms could replace them and no standards would be implemented at all. A forestry company cited Gabon's 2010 log export ban as an environmental policy that harmed compliant businesses while favouring "pirate" companies (**Table 3T**). An NNGO confirmed this, reporting an influx of Asian logging companies to Gabon after the log export ban. These companies allegedly ignored annual logging quotas and exploited forest areas supposed to be managed sustainably under permits until 2028.

3.1.12 How should contrasting Worldviews about zero deforestation and the HCSA be reconciled?

Participants called for increased multi-stakeholder participation in dialogue, and broadly agreed that “*a balanced solution exists*” (Agribusiness Representative). However, some participants held positions that were apparently beyond reconciliation (e.g., “*We don’t believe in ‘zero deforestation’*”; NGO Representative). Government officials also thought international zero deforestation policy is too strongly influenced by campaigning INGOs, whereas other participants thought campaigning INGOs are important to offset the mutual economic interests of government and business. At the national level, the National Climate Council (French acronym CNC) could provide a forum to facilitate dialogue. Concerns were raised about communities’ capacity to participate in dialogue about zero deforestation and the HCSA. However, NNGOs and agribusinesses felt that, with awareness-raising and organisational support, communities could participate more effectively. Communities viewed themselves as needing to improve their own self-representation. According to an NNGO, enhanced community self-representation could be facilitated by the organisation of local institutions, such as development associations or cooperatives.

4.0 Discussion

This is the first empirical study to have investigated stakeholder perspectives regarding zero deforestation and the HCSA in a highly forested country with a developing palm oil sector. It provides insights useful not only for Gabon, but also for other highly forested countries. Government, agribusiness, and NGO participants recognised the importance of conserving forests, but were concerned about the implications of zero deforestation for Gabon’s economic development. Other NGOs and communities were sceptical about the value of palm oil for Gabon’s rural development and food security. These latter participants questioned the economic development paradigm in which zero deforestation is used to conserve forests.

4.1 Contrasting perspectives on zero deforestation and the marginalisation of interests

The use of CSH revealed a conflict between boundary judgments – “boundary conflict” (Midgley, 2000) – arising from three contrasting perspectives on forest conservation and agro-industrial development in Gabon. An international perspective seeks the sustainable production of palm oil, following international criteria, for sale on international markets. A national perspective seeks the sustainable development of Gabon’s agro-industry, following conservation and economic development criteria, articulated through the NLUP. A local perspective seeks the preservation of traditional livelihood practices in harmony with rural development. The three contrasting perspectives result in the marginalisation of issues that fall between their boundaries (Midgley, 2000). From the international perspective, for example, zero deforestation is viewed as primarily being relevant within the palm oil sector. This marginalises the broader implications of zero deforestation for Gabon’s agro-industrial development. Holders of the national perspective, therefore, proposed careful land-use planning to ensure the agro-industrial aims of Gabon’s national development plan could be pursued with the minimum possible loss of lower-value forests. Meanwhile, the high value placed on palm oil for economic development from the national perspective marginalises the importance of forests for sustaining traditional livelihoods from the local perspective. Rural communities were critical of oil palm operations, while some INGOs and NNGOs questioned the suitability of palm oil for achieving food security and poverty alleviation.

The marginalisation of national issues by the pursuit of zero deforestation from the international perspective could produce unintended consequences that undermine the sustainable development of Gabon’s palm oil sector. For example, agribusiness participants cited converting savannahs as a way of conforming with international zero deforestation requirements. Gabon’s savannahs are regionally rare and shelter globally-rare plants (Walters et al., 2012) and threatened mammals (Hedwig et al., 2018). Savannahs converted to oil palm in Gabon have not met HCV criteria (Hoyle et al., 2015), but if large-scale conversion continues they may become increasingly rare (Versteegen et al., 2016).

Another potential unintended consequence of zero deforestation is disincentivising “responsible” business investment in Gabon. Gabon’s log export ban (2010) was cited as a previous example of a strict environmental policy that harmed responsible business. Although the ban reduced logging intensity in some concessions (Medjibe et al., 2013), it also led to the transfer of company ownership to firms allegedly “less concerned” about environmental regulations (Karsenty, 2016). Negative environmental impacts of company transfer have been observed in Indonesia, where HCV areas have been reallocated from RSPO members to non-members to ensure their conversion (Colchester et al., 2009). In Liberia, another highly forested country, the world’s largest producer of RSPO-certified palm oil sold its operations in 2020 “due largely to stricter environmental standards” (Chu and Boyle, 2020). The potential for zero deforestation to disincentivise responsible business in Gabon, and vacate the market for less scrupulous companies, cannot be ruled out. A flexible approach to zero deforestation that supports viable business may be necessary to guarantee positive environmental outcomes. International NGOs that promote zero deforestation must take responsibility for driving development of a comprehensive understanding of national perspectives in highly forested countries. The Forests Dialogue meeting held in Gabon in 2017 serves as a useful example of this (Taylor et al., 2017).

From the local perspective, zero deforestation could be interpreted as supporting communities’ interests by constraining oil palm expansion and protecting traditional livelihood practices. Traditional livelihoods in Gabon have been disrupted by changing resource governance regimes (Walters et al., 2015) and ongoing rural exodus, with 90% of Gabon’s population now urban (UNdata, 2020). This has led to ageing rural populations, declining traditional ecological knowledge, growing insecurity of traditional livelihoods, and emerging preferences for urban work (Fairet et al., 2014; Walters et al., 2014; Wunder, 2003). Nonetheless, rural communities and an NNGO expressed concerns about access to conservation areas and resources being restricted, and the implications of “scientific” approaches to defining forests. As market-based approaches to sustainability, zero

deforestation and the HCSA value land using a language of exploitation (Marin-Burgos et al., 2015). Forests are treated as spatially-distributed patches within concessions (Colchester and Anderson, 2015). This agro-industrial perspective contrasts with customary systems of land classification (**Box 1**), and may conflict with dynamic systems of land use based on shifting agriculture and forest regrowth (Cheyns et al., 2019; Colchester et al., 2014).

The HCSA requires companies to obtain communities' Free, Prior and Informed Consent (FPIC) before designating land for conservation or development (Rosoman et al., 2017). Communities' FPIC was obtained, and a social contract established, before Olam developed operations in Mouila (BSI, 2016). Despite requiring FPIC, however, the HCSA remains situated in an agro-industrial perspective focused on trading-off conservation and economic development. This entails reducing local valuations of forests, including feelings of attachments to place, to exchangeable interests (Cheyns et al., 2019). The HCSA thus offers limited support for alternative visions of rural development in which traditional ways of life are preserved. Additional steps are required to more effectively incorporate local values and perspectives in development and land-use planning. These could include participatory mapping of Gabon's villages, which is planned (CAFI, 2020); establishing development associations or cooperatives (which is ongoing); and recognising customary land property rights in national law. Research is needed to assess the potential effectiveness of these arrangements for mobilising the local perspective.

Notably, community interviews in the present study were limited by access, time and funding limitations. Communities in other African countries have been found to have heterogeneous perspectives on industrial oil palm development depending on age and economic outlook (Gilfoy, 2015). Further research on rural communities' perspectives on zero deforestation is therefore required.

4.2 Legitimising zero deforestation through contextual understanding and adapting the HCSA

Perceptions that zero deforestation is imposed by the Global North conflicted with views of the Gabonese government as sovereign. Non-state market-driven governance such as RSPO certification has previously been thought to bypass sovereignty by targeting firms (Bernstein and Cashore, 2007). However, the political legitimacy of non-state market-driven governance – its acceptance as appropriate and justified (Bernstein, 2004) – depends on meaningful stakeholder participation in rule-making and connections to formal government regimes (Schouten and Glasbergen, 2011). We found government scientists reported feeling excluded from meaningful participation in the development of the HCSA. Furthermore, zero deforestation and the HCSA were viewed by some government, agribusiness, and NNGO participants as serving foreign interests. These factors undermined the perceived legitimacy of zero deforestation. Participants identified two steps for zero deforestation to attain legitimacy in Gabon. First, there must be an improved understanding of Gabon's context by the international community; and second, the HCSA must be adapted to this context.

A more nuanced understanding of Gabon's context by international stakeholders could be attained by improving Gabonese representation and participation in international policymaking forums, such as RSPO. Although governments cannot be members of RSPO (RSPO, 2017), NNGOs' membership of RSPO should be increased. Gabonese NGOs should be invited and supported to join RSPO as members, potentially by INGOs, which have arranged NNGO participation in the past (Pesqueira and Glasbergen, 2013). However, the HCSA Toolkit remains controlled by the HCSA Steering Group, which has no Gabonese members. Any future development of internationally-applicable tools for identifying forests like the HCSA must involve researchers and policymakers from highly forested countries at an early stage.

Participants suggested that contextual adaptation should be achieved either by adapting the existing HCSA methodology or redeveloping it in Gabon. An AGB threshold of 75 tCha⁻¹ satisfies the existing HCSA criteria for young regenerating forest and would leave 1.2 mHa of non-HCV and non-HCS land available for oil palm (Austin et al., 2017). However, participants proposed raising the threshold to 118 tCha⁻¹. This is the national average for secondary forest. Raising the HCS threshold to 118 tCha⁻¹ would thus entail classifying some secondary forests, and all young regenerating forests, as non-forest. This would be a major change to the HCSA, which always defines young regenerating forest as forest (Senior, 2018). The HCSA Steering Group has ruled out adapting the HCSA Toolkit on the grounds that this would sanction deforestation (HCSA Steering Group, 2018). However, some flexibility and engagement with specific national contexts appears necessary to ensure legitimacy. A national HCS methodology is being developed by Gabon's government with partners including CAFI, and the RSPO/HCSA No Deforestation Joint Steering Group has been invited to visit the country to discuss the national context (RSPO, 2020b).

Adapting or redeveloping the HCSA for specific national contexts is not necessarily straightforward. This is because national processes for adapting international standards can be deligitimised by power asymmetries and unreconciled value judgments (Johnson, 2019; Marin-Burgos et al., 2015). Asymmetric power in Gabon's national institutions was alluded to by participants. For example, a forestry company claimed forest definitions proposed by the *Commission de Normalisation* favoured agribusiness interests. Different views about the relative importance of different forest types also revealed unreconciled value judgments. While agribusinesses and government placed a lower value on secondary forests, one forestry company valued them for the future commercial potential of young trees (although this potential may not be realised for decades). Some participants thought these contrasting views could be resolved by more data on biomass distributions. However, these views reflect contrasting judgments of value, rather than fact (Ulrich, 2000), that may be better reconciled by dialogue than by data collection. Multi-stakeholder dialogue must, therefore, be

constructed to make different groups' value judgments about different forest types explicit. In addition, the perceived influences of particular interests in national institutions like the *Commission de Normalisation* need to be managed. While it may be challenging to address these issues retrospectively, institutions should be structured to give different stakeholder constituencies equal power to influence decision making. Representatives of affected groups should also be involved in defining institutional objectives. These steps could support the legitimacy of further work on a national forest definition or HCS methodology.

4.3 Reconciling perspectives through Gabon's National Land Use Plan

Gabon's National Land Use Plan (NLUP) is intended to mitigate conflict and accommodate multiple land-use objectives (Lee, 2014) and could help reconcile the international, national, and local perspectives on zero deforestation and agro-industrial development. The NLUP is also required to ensure "non-conversion of HCV/HCS forests" under the terms of Gabon's partnership with CAFI (2017), and should provide a new legal framework to govern agricultural expansion and limit deforestation (CAFI, 2020). However, while the NLUP allocates land use at the national scale, the RSPO's zero deforestation tool (the HCSA) allocates land use at the concession scale. A mechanism is needed to "jump" between these conflicting institutional scales (Pesqueira and Glasbergen, 2013). This could be achieved by RSPO recognising Gabon's NLUP as a "jurisdictional approach".

Jurisdictional approaches are formalised, multi-stakeholder governance initiatives for sustainable resource use at jurisdictional scales (von Essen and Lambin, 2021). A jurisdictional approach to RSPO certification is under consultation for Sabah, Malaysia; Central Kalimantan, Indonesia; and Ecuador (RSPO, 2020c). Extending this to Gabon could enable the RSPO standard to "jump" between the conflicting national and concession scales. However, draft jurisdictional approaches for RSPO certification still require landscape-level zero deforestation (RSPO, 2020a). Consequently, adapting the HCSA may remain necessary.

709

710 Although participants claimed Gabon's NLUP process was designed to consider plural
711 stakeholder interests, Gabon's poor track record of multi-stakeholder engagement in policy
712 development was criticised by INGOs. This must be addressed to ensure the NLUP
713 reconciles the international, national, and local perspectives equitably. Some progress has
714 been reported on participatory land-use planning (CAFI, 2020): for example, in addition to
715 participatory village mapping, there are plans to establish provincial, district, and village-
716 based consultation centres (World Bank, 2019). Research is needed to identify institutional
717 arrangements most likely to effectively mobilise the local perspective in the NLUP process.

718

719 *4.4 The value of Critical Systems Heuristics for exploring stakeholders' perspectives*

720 CSH is normally used in action research to transform systems for the common good (Ulrich
721 and Reynolds, 2010). Here, we used it to explore stakeholders' perspectives and in a *post*
722 *hoc*, reflective mode, following Reynolds (1998), to inform change beyond the completion of
723 data gathering and analysis. In this mode, we found CSH useful for achieving our research
724 aim. A limitation was the focus on zero deforestation as a "system of interest" (Ulrich and
725 Reynolds, 2010). While this provided a subject for the interviews, it framed the study in an
726 industrial vision of forest conservation as an economic optimisation problem (Cheyns et al.,
727 2019). This made it difficult to depart from the framing of conservation and development as
728 'either-or'. This problem was ameliorated to some extent through the reflective process of
729 boundary critique. However, future studies may benefit framing the system of interest more
730 loosely, or using a methodology based on an African epistemology that may be better suited
731 to the research context (Chilisa, 2017).

732

733 **5.0 Conclusions**

734 Zero deforestation represents an international perspective on palm oil and forest
735 conservation that marginalises important issues from a national perspective in Gabon. This
736 produces unintended consequences and undermines the legitimacy of zero deforestation.

Our study suggests that in highly forested countries, a flexible approach to zero deforestation – based on contextual understanding and adapting implementation tools – is required to support positive environmental outcomes. However, this alone may be insufficient to ensure equity. From a local perspective, zero deforestation represents an agro-industrial vision of forest conservation that marginalises alternative value judgments concerning rural development and food security. The international, national, and local perspectives may be reconciled through national land-use plans, which could be formally recognised by RSPO as jurisdictional approaches. This requires national institutions capable of balancing dominant agribusiness interests and guaranteeing participatory land-use planning. NGOs from highly forested countries also require increased representation in international forums such as RSPO; increased international engagement with specific national contexts is also essential. Gabon’s case suggests the current applicability of zero deforestation and the HCSA to other highly forested countries cannot be assumed. Understanding national contexts, and ensuring implementation tools can be adapted, is essential to ensure sustainability standards that are effective and equitable at local, national and international scales.

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7.0 Author Contributions

J.L.W. led the study design, collected and analysed the data, and drafted the manuscript; C.M.Y., R.M.E., and A.T.K. supervised the study, contributed to the design and analysis, and edited the manuscript.

8.0 Declaration of Interest

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9.0 References

- 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, 014005.
- Bernstein, S. (2004) Legitimacy in global environmental governance. *Journal of International Law & International Relations* 1, 139-166.
- Bernstein, S., Cashore, B. (2007) Can non-state global governance be legitimate? An analytical framework. *Regulation & Governance* 1, 347-371.
- Brinkmann, S., Kvale, S. (2015) *InterViews: Learning the Craft of Qualitative Research Interviewing*, 3rd ed. SAGE Publications, Inc., Thousand Oaks, CA.
- BSI (2016) *RSPO Principle and Criteria Initial Assessment: Public Summary Report: Olam Palm Gabon – Bilala Palm Oil Mill & Supply Base*. BSI Services Malaysia Sdn Bhd, Kuala

792 Lumpur, Malaysia. Available at:

793 [https://www.olamgroup.com/content/dam/olamgroup/pdf/Olam-International-Mouila-](https://www.olamgroup.com/content/dam/olamgroup/pdf/Olam-International-Mouila-Bilala-POM-RSPO-PC-Public-Summary-Report-IAV-2017.pdf)

794 [Bilala-POM-RSPO-PC-Public-Summary-Report-IAV-2017.pdf](https://www.olamgroup.com/content/dam/olamgroup/pdf/Olam-International-Mouila-Bilala-POM-RSPO-PC-Public-Summary-Report-IAV-2017.pdf). Accessed September 2020.

795 Burton, M.E.H., Poulsen, J.R., Lee, M.E., Medjibe, V.P., Stewart, C.G., Venkataraman, A.,

796 White, L.J.T. (2017) Reducing carbon emissions from forest conversion for oil palm

797 agriculture in Gabon. *Conservation Letters* 10, 297-307.

798 CAFI (2017) Letter of intent to establish the partnership between the Government of the

799 Gabonese Republic (Gabon) and the Central African Forest Initiative (CAFI) to implement

800 the national investment framework of Gabon. Central African Forests Initiative, Châtelaine,

801 Switzerland. Available at: [https://www.cafi.org/content/cafi/en/home/partner-](https://www.cafi.org/content/cafi/en/home/partner-countries/gabon/the-letter-of-intent-with-gabon.html)

802 [countries/gabon/the-letter-of-intent-with-gabon.html](https://www.cafi.org/content/cafi/en/home/partner-countries/gabon/the-letter-of-intent-with-gabon.html). Accessed August 2020.

803 CAFI (2020) CAFI Trust Fund 2019 Consolidated Report. Central African Forest Initiative,

804 Châtelaine, Switzerland. Available at: [https://www.cafi.org/content/cafi/en/home/all-](https://www.cafi.org/content/cafi/en/home/all-news/highlights-of-the-cafi-2019-annual-report.html)

805 [news/highlights-of-the-cafi-2019-annual-report.html](https://www.cafi.org/content/cafi/en/home/all-news/highlights-of-the-cafi-2019-annual-report.html). Accessed August 2020.

806 Carlson, K.M., Heilmayr, R., Gibbs, H.K., Noojipady, P., Burns, D.N., Morton, D.C., Walker,

807 N.F., Paoli, G.D., Kremen, C. (2018) Effect of oil palm sustainability certification on

808 deforestation and fire in Indonesia. *Proceedings of the National Academy of Sciences* 115,

809 121-126.

810 Cheyns, E., Silva-Castañeda, L., Aubert, P.-M. (2019) Missing the forest for the data?

811 Conflicting valuations of the forest and cultivable lands. *Land Use Policy*, 103591.

812 Chilisa, B. (2017) Decolonising transdisciplinary research approaches: an African

813 perspective for enhancing knowledge integration in sustainability science. *Sustainability*

814 *Science* 12, 813-827.

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

819 Clark, S.G. (2002) The Policy Process: A practical guide for natural resources professionals.
 820 Yale University Press, New Haven, CT.

821 Colchester, M., Anderson, P. (2015) HCS Science Study Consulting Study 11: Respecting
 822 rights and securing livelihoods in conserving 'High Carbon Stock' forests. Sustainable Palm
 823 Oil Manifesto. Available at:
 824 [http://www.simedarbyplantation.com/sites/default/files/sustainability/high-carbon-](http://www.simedarbyplantation.com/sites/default/files/sustainability/high-carbon-stock/consulting-reports/socio-economic/hcs-consulting-report-11-respecting-rights-and-securing-livelihoods-in-conserving-high-carbon-stock-forests.pdf)
 825 [stock/consulting-reports/socio-economic/hcs-consulting-report-11-respecting-rights-and-](http://www.simedarbyplantation.com/sites/default/files/sustainability/high-carbon-stock/consulting-reports/socio-economic/hcs-consulting-report-11-respecting-rights-and-securing-livelihoods-in-conserving-high-carbon-stock-forests.pdf)
 826 [securing-livelihoods-in-conserving-high-carbon-stock-forests.pdf](http://www.simedarbyplantation.com/sites/default/files/sustainability/high-carbon-stock/consulting-reports/socio-economic/hcs-consulting-report-11-respecting-rights-and-securing-livelihoods-in-conserving-high-carbon-stock-forests.pdf). Accessed May 2020.

827 Colchester, M., Anderson, P., Jiwan, N., Toh, A., Toh, S. (2009) HCV and the RSPO: report
 828 of an independent investigation into the effectiveness of the application of High Conservation
 829 Value zoning in palm oil development in Indonesia. Available at:
 830 [http://www.forestpeoples.org/sites/default/files/publication/2010/08/rspoidonesiahcvstudyre](http://www.forestpeoples.org/sites/default/files/publication/2010/08/rspoidonesiahcvstudyreportoct09eng.pdf)
 831 [portoct09eng.pdf](http://www.forestpeoples.org/sites/default/files/publication/2010/08/rspoidonesiahcvstudyreportoct09eng.pdf). Accessed April 2020.

832 Colchester, M., Jiwan, N., Kleden, E. (2014) Independent review of the social impacts of
 833 Golden Agri Resources' Forest Conservation Policy in Kapuas Hulu District, West
 834 Kalimantan. Forest Peoples Programme, Moreton-in-Marsh, UK. Available at:
 835 [https://www.forestpeoples.org/en/topics/palm-oil-rspo/publication/2014/independent-review-](https://www.forestpeoples.org/en/topics/palm-oil-rspo/publication/2014/independent-review-social-impacts-golden-agri-resources-forest)
 836 [social-impacts-golden-agri-resources-forest](https://www.forestpeoples.org/en/topics/palm-oil-rspo/publication/2014/independent-review-social-impacts-golden-agri-resources-forest). Accessed May 2020.

837 Deere, N.J., Guillera-Arroita, G., Baking, E.L., Bernard, H., Pfeifer, M., Reynolds, G., Wearn,
 838 O.R., Davies, Z.G., Struebig, M.J. (2017) High Carbon Stock forests provide co-benefits for
 839 tropical biodiversity. *Journal of Applied Ecology* 55, 997-1008.

840 Fairet, E., Bell, S., Remanda, K., Setchell, J.M. (2014) Rural emptiness and its influence on
 841 subsistence farming in contemporary Gabon: A case study in Loango National Park. *Society,*
 842 *Biology and Human Affairs* 78, 39-59.

843 Garrett, R.D., Levy, S., Carlson, K.M., Gardner, T.A., Godar, J., Clapp, J., Dauvergne, P.,
 844 Heilmayr, R., le Polain de Waroux, Y., Ayre, B., et al. (2019) Criteria for effective zero-
 845 deforestation commitments. *Global Environmental Change* 54, 135-147.

846 Gilfoy, K. (2015) Land grabbing and NGO advocacy in Liberia: A deconstruction of the
 847 'homogeneous community'. *African Affairs* 114, 185-205.

848 Greenpeace (2007) How the palm oil industry is cooking the climate. Greenpeace
 849 International, Amsterdam. Available at:
 850 <http://www.greenpeace.org/international/en/publications/reports/cooking-the-climate-full/>.
 851 Accessed December 2017.

852 HCSA Steering Group (2018) HCSA Steering Group statement on high forest cover
 853 landscapes. HCSA Steering Group, Kuala Lumpur, Malaysia. Available at:
 854 <http://highcarbonstock.org/hcsa-steering-group-statement-on-high-forest-cover-landscapes/>.
 855 Accessed November 2020.

856 Hoyle, D., Versteegen, A., Senior, M. (2015) HCV assessment summary: Mouila Lot 3,
 857 Ngounié, Gabon. Proforest, Oxford, UK. Available at:
 858 <https://hcvrn.egnyte.com/dl/a7iWD6jx8z/>. Accessed March 2020.

859 Johnson, A. (2019) The Roundtable on Sustainable Palm Oil's national interpretation
 860 process in Ecuador: 'Fitting' global standards into local contexts. *Journal of Rural Studies* 71,
 861 125-133.

862 Karsenty, A. (2016) The contemporary forest concessions in West and Central Africa:
 863 chronicle of a foretold decline?, *Forestry Policy and Institutions Working Paper*. FAO, Rome,

Italy. Available at: <http://www.fao.org/forestry/45021-04023cd52f4619cd28fe747b7e42c167f.pdf>. Accessed September 2020.

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., et al. (2019) Improving conservation practice with principles and tools from systems thinking and evaluation. *Sustainability Science* 14, 1531-1548.

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., et al. (2018) The role of supply-chain initiatives in reducing deforestation. *Nature Climate Change* 8, 109-116.

Lee, M.E., (2014) Conservation and land use planning applications in Gabon, Central Africa. PhD Thesis. Oxford University, UK.

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.

Marin-Burgos, V., Clancy, J.S., Lovett, J.C. (2015) Contesting legitimacy of voluntary sustainability certification schemes: Valuation languages and power asymmetries in the Roundtable on Sustainable Palm Oil in Colombia. *Ecological Economics* 117, 303-313.

Medjibe, V.P., Putz, F.E., Romero, C. (2013) Certified and Uncertified Logging Concessions Compared in Gabon: Changes in Stand Structure, Tree Species, and Biomass. *Environmental Management* 51, 524-540.

Meijaard, E., Garcia-Ulloa, J., Sheil, D., Wich, S.A., Carlson, K.M., Juffe-Bignoli, D., Brooks, T.M. (2018) Oil palm and biodiversity: a situation analysis by the IUCN Oil Palm Task Force, International Union for the Conservation of Nature (IUCN): IUCN Oil Palm Task Force. Available at: <https://portals.iucn.org/library/node/47753>. Accessed June 2018.

888 Midgley, G. (2000) Systemic Intervention. Springer, Boston, MA.

889 Mikolo Yobo, C., Ito, K. (2016) Evolution of policies and legal frameworks governing the
890 management of forest and National Parks resources in Gabon. International Journal of
891 Biodiversity and Conservation 8, 41-54.

892 Newton, P., Agrawal, A., Wollenberg, L. (2013) Enhancing the sustainability of commodity
893 supply chains in tropical forest and agricultural landscapes. Global Environmental Change
894 23, 1761-1772.

895 Nikoloyuk, J., Burns, T.R., de Man, R. (2010) The promise and limitations of partnered
896 governance: the case of sustainable palm oil. Corporate Governance: The International
897 Journal of Business in Society 10, 59-72.

898 Olam International (2019) Palm Business: 2019 annual sustainability report. Olam
899 International, Singapore. Available at:
900 [https://www.olamgroup.com/content/dam/olamgroup/products/food-staples/edible-oils/edible-](https://www.olamgroup.com/content/dam/olamgroup/products/food-staples/edible-oils/edible-oils-pdfs/Sustainable-Palm-Annual-Progress-Update.pdf)
901 [oils-pdfs/Sustainable-Palm-Annual-Progress-Update.pdf](https://www.olamgroup.com/content/dam/olamgroup/products/food-staples/edible-oils/edible-oils-pdfs/Sustainable-Palm-Annual-Progress-Update.pdf). Accessed November 2020.

902 Onwuegbuzie, A.J., Leech, N.L. (2007) Sampling designs in qualitative research: Making the
903 sampling process more public. Qualitative Report 12, 238-254.

904 Pendrill, F., Persson, U.M., Godar, J., Kastner, T. (2019) Deforestation displaced: trade in
905 forest-risk commodities and the prospects for a global forest transition. Environmental
906 Research Letters 14, 055003.

907 Pesqueira, L., Glasbergen, P. (2013) Playing the politics of scale: Oxfam's intervention in the
908 Roundtable on Sustainable Palm Oil. Geoforum 45, 296-304.

909 QSR International, (2019) NVivo 12 Plus v12.3.0.599 (64 bit). QSR International Pty Ltd.

910 République Gabonaise (2004) Décret n° 692/PR/MEFEPEPN du 24 août 2004. République
 911 Gabonaise, Libreville, Gabon. Available at:
 912 <http://extwprlegs1.fao.org/docs/pdf/Gab174469.pdf>. Accessed September 2020.

913 République Gabonaise (2012) Plan Strategique Gabon Emergent: vision 2025 et
 914 orientations strategiques 2011-2016. République Gabonaise, Libreville, Gabon. Available at:
 915 <http://visiongabon.com/publications/>. Accessed June 2019.

916 République Gabonaise (2015a) Contribution prévue déterminée au niveau national.
 917 UNFCCC. Available at: <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>. Accessed
 918 April 2020.

919 République Gabonaise (2015b) Plan Opérationnel Gabon Vert Horizon 2025: donner à
 920 l'émergence une trajectoire durable. Présidence de la République Gabonaise, Libreville,
 921 Gabon. Available at:
 922 [https://www.undp.org/content/dam/cafi/docs/Gabon%20documents/French/Gabon-](https://www.undp.org/content/dam/cafi/docs/Gabon%20documents/French/Gabon-2015_Gabon-vert.pdf)
 923 [2015_Gabon-vert.pdf](https://www.undp.org/content/dam/cafi/docs/Gabon%20documents/French/Gabon-2015_Gabon-vert.pdf). Accessed August 2020.

924 Reynolds, M. (1998) "Unfolding" Natural Resource-Use Information Systems: Fieldwork in
 925 Botswana. Systemic Practice and Action Research 11, 127-152.

926 Robinson, O.C. (2014) Sampling in Interview-Based Qualitative Research: A Theoretical and
 927 Practical Guide. Qualitative Research in Psychology 11, 25-41.

928 Rosoman, G., Sheun, S.S., Opal, C., Anderson, P., Trapshah, R., editors (2017) The HCS
 929 Approach Toolkit Version 2.0. HCS Approach Steering Group, Singapore. Available at:
 930 <http://highcarbonstock.org/the-hcs-approach-toolkit/>. Accessed July 2019.

931 Rothrock, P., Weatherer, L., Zwick, S. (2019) Corporate commitments to zero deforestation:
 932 Company progress on commitments that count, 2019, in: Donofrio, S., Hamrick, K. (Eds.).
 933 Supply Change, Washington, D.C. Available at: <https://www.forest-trends.org/wp->

934 [content/uploads/2019/06/2019.06.05-Supply-Change-Targeting-Zero-Deforestation-Report-](#)
935 [Final.pdf](#). Accessed March 2020.

936 RSPO (2017) Ask RSPO: Can governments join the RSPO?, Available at:
937 <https://askrspo.force.com/s/article/Can-governments-join-the-RSPO>. Accessed April 2020.

938 RSPO (2018a) Principles & Criteria draft 2 (public consultation). RSPO, Kuala Lumpur,
939 Malaysia. Available at: [https://www.rspo.org/principles-and-criteria-review/2nd-public-](https://www.rspo.org/principles-and-criteria-review/2nd-public-consultation-rspo-principles-and-criteria)
940 [consultation-rspo-principles-and-criteria](https://www.rspo.org/principles-and-criteria-review/2nd-public-consultation-rspo-principles-and-criteria). Accessed July 2018.

941 RSPO (2018b) Principles and Criteria for the production of sustainable palm oil. RSPO, Kota
942 Kinabalu, Malaysia. Available at: [https://rspo.org/key-documents/certification/rspo-principles-](https://rspo.org/key-documents/certification/rspo-principles-and-criteria)
943 [and-criteria](https://rspo.org/key-documents/certification/rspo-principles-and-criteria). Accessed January 2019.

944 RSPO (2019) No Deforestation Joint Steering Group (NDJSG): terms of reference. RSPO,
945 Kuala Lumpur, Malaysia. Available at: [http://highcarbonstock.org/wp-](http://highcarbonstock.org/wp-content/uploads/2019/02/20190128-NDJSG-ToR-Final.pdf)
946 [content/uploads/2019/02/20190128-NDJSG-ToR-Final.pdf](http://highcarbonstock.org/wp-content/uploads/2019/02/20190128-NDJSG-ToR-Final.pdf). Accessed May 2020.

947 RSPO (2020a) Jurisdictional Approach for Certification: Second Draft. RSPO, Kuala Lumpur,
948 Malaysia. Available at: <https://www.rspo.org/resources/archive/1070>. Accessed May 2020.

949 RSPO (2020b) Principles and Criteria for the production of sustainable palm oil 2018: Gabon
950 National Interpretation developed by the National Interpretation Working Group 2019-2020 –
951 English Translation. RSPO, Kuala Lumpur. Available at: [https://rspo.org/news-and-](https://rspo.org/news-and-events/announcements/endorsement-of-gabon-national-interpretation-2020)
952 [events/announcements/endorsement-of-gabon-national-interpretation-2020](https://rspo.org/news-and-events/announcements/endorsement-of-gabon-national-interpretation-2020). Accessed
953 November 2020.

954 RSPO (2020c) UPDATE: Second Public Consultation for Jurisdictional Approach. Kuala
955 Lumpur, Malaysia. Available at: [https://rspo.org/news-and-events/announcements/update-](https://rspo.org/news-and-events/announcements/update-second-public-consultation-for-jurisdictional-approach)
956 [second-public-consultation-for-jurisdictional-approach](https://rspo.org/news-and-events/announcements/update-second-public-consultation-for-jurisdictional-approach). Accessed May 2020.

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

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

962 Senior, M.J.M. (2018) RSPO No deforestation consultancy: high forest cover countries.
 963 Consultancy report on definitions and recommendations to the RSPO. Proforest, Oxford, UK.
 964 Available at: [https://rspo.org/principles-and-criteria-review/rspo-high-forest-cover-countries-](https://rspo.org/principles-and-criteria-review/rspo-high-forest-cover-countries-consultancy-report)
 965 [consultancy-report](https://rspo.org/principles-and-criteria-review/rspo-high-forest-cover-countries-consultancy-report). Accessed July 2018.

966 Sullivan, M.J.P., Talbot, J., Lewis, S.L., Phillips, O.L., Qie, L., Begne, S.K., Chave, J., Cuni-
 967 Sanchez, A., Hubau, W., Lopez-Gonzalez, G., et al. (2017) Diversity and carbon storage
 968 across the tropical forest biome. *Scientific Reports* 7, 39102.

969 Taylor, R., Meunier, Q., Moungwengui, P., Eyang Effa, E. (2017) Understanding
 970 Deforestation Free Commitments in Central African Context, Mouila. The Forests Dialogue,
 971 Mouila, Gabon. Available at: [https://theforestdialogue.org/news/co-chairs-summary-](https://theforestdialogue.org/news/co-chairs-summary-understanding-deforestation-free-commitments-central-african-context-mouila)
 972 [understanding-deforestation-free-commitments-central-african-context-mouila](https://theforestdialogue.org/news/co-chairs-summary-understanding-deforestation-free-commitments-central-african-context-mouila). Accessed
 973 March 2020.

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

976 Ulrich, W. (2000) *Reflective Practice in the Civil Society: The contribution of critically*
 977 *systemic thinking*. *Reflective Practice* 1, 247-268.

978 Ulrich, W., Reynolds, M., (2010) *Critical Systems Heuristics*, in: Reynolds, M., Holwell, S.
 979 (Eds.), *Systems Approaches to Managing Change: A Practical Guide*. Springer London,
 980 London, pp. 243-292.

UNdata (2020) Gabon. United Nations Statistics Division, New York, NY. Available at:
<http://data.un.org/en/iso/ga.html>. Accessed September 2020.

Van Manen, M. (2016) Researching lived experience: Human science for an action sensitive pedagogy. Routledge, Oxford, UK.

Versteegen, A., Hoyle, D., Mboumba, A. (2016) High Conservation Value assessment for RSPO NPP compliance: SOTRADER, Ndendé Gabon. Proforest, Oxford, UK. Available at:
<https://hcvrn.egnyte.com/dl/ttVggeTyTS/>. Accessed June 2016.

von Essen, M., Lambin, E.F. (2021) Jurisdictional approaches to sustainable resource use. Frontiers in Ecology and the Environment <https://doi.org/10.1002/fee.2299>.

Walters, G.M., Makouka, L., Touladjan, S. (2014) Integrating cultural and conservation contexts of hunting: the case of the Plateau Bateke savannas of Gabon. African Study Monographs 35, 99-128.

Walters, G.M., Parmentier, I., Stévant, T. (2012) Diversity and conservation value of Gabon's savanna and inselberg open vegetation: an initial gap analysis. Plant Ecology and Evolution 145, 46-54.

Walters, G.M., Schleicher, J., Hymas, O., Coad, L. (2015) Evolving hunting practices in Gabon: lessons for community-based conservation interventions. Ecology and Society 20, 31.

World Bank (2019) Readiness preparation proposal assessment note on a proposed grant in the amount US \$1.95 million to the Republic of Gabon for Gabon - REDD+ Readiness (P167065). World Bank. Available at:
<http://documents1.worldbank.org/curated/pt/149011569269725956/pdf/Assessment-Note.pdf>. Accessed June 2019.

1004 Wunder, S. (2003) When the Dutch Disease met the French Connection: Oil,
1005 macroeconomics and Forests in Gabon. Center for International Forestry Research, Jakarta,
1006 Indonesia.
1007