

The construction of feelings of justice in environmental management: an empirical study of multiple biodiversity conflicts in Calakmul, Mexico

Lou Lecuyer¹, Rehema M. White², Birgit Schmook³, Violaine Lemay⁴, Sophie Calmé^{1,3}

1. Université de Sherbrooke, Quebec, Canada
Département de biologie
Université de Sherbrooke
2500, boulevard de l'Université
Sherbrooke, QC, Canada J1K 2R1
marie.lou.lecuyer@usherbrooke.ca
Sophie.Calme@usherbrooke.ca
2. University of St Andrews, Scotland, UK
School of Geography & Sustainable Development
Irvine Building, University of St Andrews
North Street, St Andrews, KY16 9AL
Fife, Scotland, UK
rehema.white@st-andrews.ac.uk
3. El Colegio de la Frontera Sur, Chetumal, Mexico
Departamento de Conservación de la Biodiversidad
Av. Centenario km 5.5
CP 77014, Chetumal, Quintana Roo, Mexico
bschmook@ecosur.mx
4. Université de Montréal, Quebec, Canada
Université de Montréal
C.P. 6128, succ. Centre-ville
Montréal (QC), Canada, H3C 3J7
violaine.lemay@umontreal.ca

CORRESPONDING AUTHOR

Lou Lecuyer
Département de biologie
Université de Sherbrooke
2500, boulevard de l'Université
Sherbrooke, QC, Canada J1K 2R1
marie.lou.lecuyer@usherbrooke.ca

Abstract

A failure to address social concerns in biodiversity conservation can lead to feelings of injustice among some actors, and hence jeopardise conservation goals. The complex socio-cultural and political context of the Calakmul Biosphere Reserve, Mexico, has historically led to multiple biodiversity conflicts. Our goal, in this case study, was to explore perceptions of justice held by local actors in relation to biodiversity conflicts. We then aimed to determine the following: 1) people's definitions of their feelings of justice; 2) the criteria used in this assessment; 3) variability in the criteria influencing them; and 4) implications for environmental management in the region and beyond. We worked with five focus groups, exploring three examples of biodiversity conflict around forest, water and jaguar management with a total of 41 ranchers, farmers and representatives of local producers. Our results demonstrated that people constructed their feelings of justice around four dimensions of justice: recognition (acknowledging individuals' rights, values, cultures and knowledge systems); ecological (fair and respectful treatment of the natural environment), procedural (fairness in processes of environmental management), distributive (fairness in the distribution of costs and benefits). We identified a list of criteria the participants used in their appraisal of justice and sources of variation such as the social scale of focus and participant role, and whom they perceived to be responsible for resource management. We propose a new framework that conceptualizes justice-as-recognition and ecological justice as forms of conditional justices, and procedural and distributive justices as forms of practical justice. Conditional justice allows us to define who is a legitimate source of justice norms and if nature should be integrated in the scope of justice; hence, conditional justice is salient to other dimensions of justice. On the other hand, procedural and distributive address the daily practices of fair processes and distribution. We propose that the perception of justice is a neglected but important aspect to include in integrative approaches to managing biodiversity conflicts. Addressing demands of justice in environmental management will require us to consider more than the distribution of costs and benefits among actors. We also need to respect the plurality of fairness perspectives and to recognise the benefits of dialogical approaches to achieve more successful environmental management.

KEYWORDS: fairness; procedural justice; distributive justice; ecological justice; recognition justice

1. Introduction

Top-down biodiversity conservation plans have often enforced conservation measures irrespective of locals' interests and rights (Negi and Nautiya, 2003; Paavola, 2004). The imposition on local communities of the responsibilities of environmental protection and the resulting conflicts have opened up debates regarding environmental fairness (Yearley, 2005). A potential paradox emerges: while environmental protection is required to contribute significantly to global well-being, it often depends on local communities' support; yet these communities can experience disproportionately high costs and thus perceive unfairness (McShane et al., 2011). Decision-making in biodiversity conservation therefore needs to not only ensure ecological integrity, but also to integrate social justice among other dimensions of sustainable development.

The question of social justice in biodiversity conservation is vital, as biodiversity conflicts often stem from feelings of injustice, with involved parties sometimes strongly defending the rights of individuals, communities, future generations and the environment (Clayton, 2000; Clayton et al., 2016). In this research, biodiversity conflict is defined as occurring when the interests of two or more parties in some aspect of biodiversity compete, and when at least one of the parties is perceived to assert its interests at the expense of another (Marshall et al., 2007). It is proposed that in such conflict, perceived justice may even be a better predictor of environmental attitudes than self-interest (Clayton, 2000; Reese and Jacob, 2015), and very often guides the assessments, feelings, and behaviours of the parties involved (Kals and Russell, 2001). For example, perceived fairness in a procedure leads to higher acceptance of the outcome, satisfaction with the result, support of decision-makers, and trust in authorities (Lind and Tyler, 1988; Syme and Nancarrow, 2012). We support the proposal of Ohl and colleagues (2008) that the feeling of justice (i.e. fairness) in biodiversity conservation is a prerequisite for effective biodiversity conflict management. Considering people's concerns regarding fairness and justice, rather than just individual interests, can help us to understand the causes of biodiversity conflict and address injustice (Clayton, 2000; Müller, 2011).

A complex socio-cultural and political context around the Calakmul Biosphere Reserve in Mexico has led to multiple biodiversity conflicts in the region. We used three of these identified conflicts as examples to explore feelings of justice in environmental management: forest, water and wildlife management. For this study, we conducted focus groups with local actors to investigate their perception of justice regarding these conflicts, the criteria on which

they build their perception, and the variation among those criteria. We proposed that local actors would have diverse ways of seeing 'justice', and that justice appraisals would be tentative and likely to vary across communities, issues, and contexts, as suggested by others (Kals and Russell, 2001; Kellerhals et al., 1997; Paavola, 2004). Specifically, we asked the following research questions: 1) How do people feel and define their notions of justice regarding environmental management? 2) Which criteria do they use to assess the fairness of environmental management in the region? 3) What are the sources of variation in these criteria? 4) What are the implications for environmental management in the region and beyond?¹ We first explore the debates surrounding environmental justice and ecological justice as they may apply within environmental management. Secondly, we test the variability in local actors' justice appraisals. Finally, we explore how the theory of and the practical quest for subjective justice help us to understand and address biodiversity conflicts and contribute to our pursuits of sustainable development and environmental management.

1.1. Feelings of justice in environmental management

In this section, we critically analyze the debates within the literature around environmental justice and fairness, particularly considering our instrumental focus on achieving enhanced biodiversity conservation. We take some distance from the dominant debate around justice theory (Rawls, 1971) and adopt an empirical approach acknowledging the social construction of 'feelings of justice', which is also referred to as 'fairness judgment'. The way justice is perceived is by nature subjective: the injustice lies in "the eye of the actor", and what is considered just by one might be seen as unjust by another (Gross, 2011; Lauber, 1999). Feelings can differ widely depending on individual views of justice, values, needs and attachment to nature, with no single understanding of what is morally right (Martin et al., 2013; Müller, 2011). Furthermore, individuals might use different criteria of justice depending on the situation. For example, in Western societies, the right to vote is based on equality, while job attribution is based on merit (Deutsch, 2011). Our approach recognizes that justice claims are plural and contextual, and that to improve biodiversity conflict management, we will have to identify sources of variation in the perception of justice and which dimensions of justice prevail against

¹ While this paper focuses on the instrumental benefit of achieving or improving feelings of fairness, we recognize that the pursuit of fairness is itself a desirable goal and has wider moral imperatives.

others.

Previous attempts to reconcile social justice and environmental integrity have been attempted under the environmental justice framework (Schlosberg, 2013; Shoreman-Ouimet and Kopnina, 2015; Walker, 2012). ‘Environmental justice’ is a concept once employed in cases of environmental harm (e.g. chemical pollution) imposed by humans on other humans (Čapek, 1993). Its use has since broadened to other issues such as climate change (Agyeman et al., 2016) and wildlife management (Dawson et al., 2017; Jacobsen and Linnell, 2016; Lauber, 1999), ranging from local to global focus (Walker, 2009), and developed conceptual depth such as giving moral consideration for nonhuman nature (Schlosberg, 2013). Recent works in environmental justice have also attempted to look beyond the concern of fair resources distribution, to other concerns such as decision-making, identity and power-relations (Lauber, 1999; Martin et al., 2013, 2014; Schlosberg, 2007; Walker, 2012). These different debates have thus explored the notion of justice in diverse ways.

Early research towards the construction of environmental justice appraisal focused mainly on the distribution of environmental benefits and negative impacts through *distributive* and *procedural justices* (Cohen, 1985; Deutsch, 1975). *Distributive justice* explores the fair and equitable distribution of resources at individual and societal levels (Deutsch, 1985). For example, Loomis and Ditton (1993) highlighted the importance of understanding the perception of *distributive justice* in the allocation of fishery quotas when resources are scarce. Their study demonstrated that there is little guidance on how ‘fair’ can be qualified and quantified, and how the concept can be applied or evaluated in management decisions. There was then an emphasis on exploring the dimension of *procedural justice*: the decision process leading to the distribution of costs and benefits (Lind and Tyler, 1988). An example is the Natura 2000 zone in Europe, for which there was insufficient public consultation in the decision-making process leading to its establishment, resulting in mistrust and a reduced list of designated protected sites in France (Paavola, 2004). While often approached separately, distributive and procedural justices interact, as acknowledged early on by Lynd and Tyler (1988). Fair perceptions of the decision-making process increase potential perceptions of a fair distributive outcome, while a fair outcome might make actors evaluate the procedure more positively (Van den Bos et al., 1997). Similarly, perceived unfavorable outcomes might make actors more likely to find fault with a decision-making process (Bies, 1987).

The construction of justice, however, is not only about how decisions are taken and

costs and benefits shared; it is also about who should be considered during these processes. This is where the dimension of *ecological justice* is relevant, as it recognizes the right to live of other species (Clayton, 2000; Parris et al., 2014). *Ecological justice* is defined in the field of social psychology “not so much by a particular philosophical perspective (e.g. equality of rights, individual or group level) as by the inclusion of remote entities, such as the environment or future generations, in one’s consideration of a just resolution to a conflict” (Clayton, 2000, p. 467). Ecological justice thus allows inclusion of non-human entities in the scope of consideration of justice and has been used to support environmental protection goals. For instance, Opatow (1994) showed that people who included the bombardier beetle (*Brachinus* sp.) in their scope of justice were more willing to preserve it. Ecological justice was also discussed more recently by authors who wish to expand the consideration of environmental justice to human relationships with non-humans (Schlosberg, 2013). Schlosberg (2007) suggested shifting the discussion of environmental justice from using environmental conditions as an example of social injustice, to addressing how justice could also incorporate the treatment of the environment itself.

Other debates regarding environmental justice have focused on the notions of identity, right to self-determination and actors’ relationships. At the individual level, researchers have sometimes distinguished particular aspects of procedural fairness, around interactions among actors, which they refer to as *interactional justice* (Bies et al., 2001; Syme and Nancarrow, 2012). *Interactional justice* considers components of the communication process between the source and the recipient of justice, such as politeness and honesty (Bies et al., 2001). The debate has widened to cover the importance of cultural diversity, misrecognition, and misrepresentation under the concept of *justice-as-recognition* (Schlosberg, 2007; Walker, 2012). In the field of environmental management, *justice-as-recognition* was defined as the need to respect differences in value and knowledge systems and the struggle to avoid cultural domination (Martin et al. 2016). Studies referring to *justice-as-recognition* often emphasized indigenous rights (Martin et al., 2013, 2014, Schlosberg and Carruthers, 2010); however, *justice-as-recognition* was also used more broadly to include the recognition of the right to dignity, denouncing all forms of denigration and stigmatisation that devalue some people in comparison to others (Fraser, 2001). *Justice-as-recognition* can therefore exist beyond the question of indigenous right and address claims to preserve identity, community, and traditional ways of life (e.g., Olive, 2016). Finally, it is important to mention that some authors (e.g., Jacobsen and Linnell, 2016; Martin et al., 2016; Schlosberg, 2007) have

included in the scope of justice-as-recognition, acknowledgement of the right of biodiversity (often represented as particular species or ecosystems) to exist, which relates to ecological justice.

This reflection on the plurality of justice dimensions and the debates surrounding them helps us enrich our conceptualization of justice and support its application to different situations (Sikor et al., 2014). We have reviewed here how different debates have arisen regarding procedural and distributive justices, ecological justice, justice-as-recognition and interactional justice. These discourses on justice propose different but sometimes complementary explanations of the dimensions of justice while suggesting different relationships between these dimensions. Our research, while considering existing definitions and dimensions of justice, will empirically pursue perceptions of fairness, offering an opportunity to challenge the debate surrounding the theorisation of environmental justice by examining how it is articulated on the ground. We aim to contribute conceptually to the framing of constructions of justice and also to offer practical recommendations for how different claims for justice could be incorporated in the management of biodiversity conflict.

2. Methods

2.2. Study area

Calakmul (Figure 1) is home to 28,424 people (INEGI, 2015), two-thirds of whom work in semi-subsistence agriculture. Calakmul's settlements, mostly *ejidos*² (communal land tenure settlements), mainly date from the 1970s and 1980s, when timber extraction, road construction, and state-sponsored land distribution created villages. In the 1980s and 1990s, Calakmul population had turnover often precipitated by violent conflicts over resources (Ericson et al., 1999). Today Calakmul is home to an ethnic mix of peninsular Mayans, indigenous people mostly from Chiapas (e.g. Ch'ol and Tzeltal), and mestizos or non-indigenous people predominantly from the Mexican states of Veracruz and Tabasco (Gurri, 2003).

² An *ejido* is constituted with community members called *ejidatarios* who for the most part individually farm designated parcels while collectively maintaining communal holdings. *Ejidatarios* do not actually own the land but are allowed to use their allotted parcels indefinitely as long as they do not fail to use the land for more than two years.

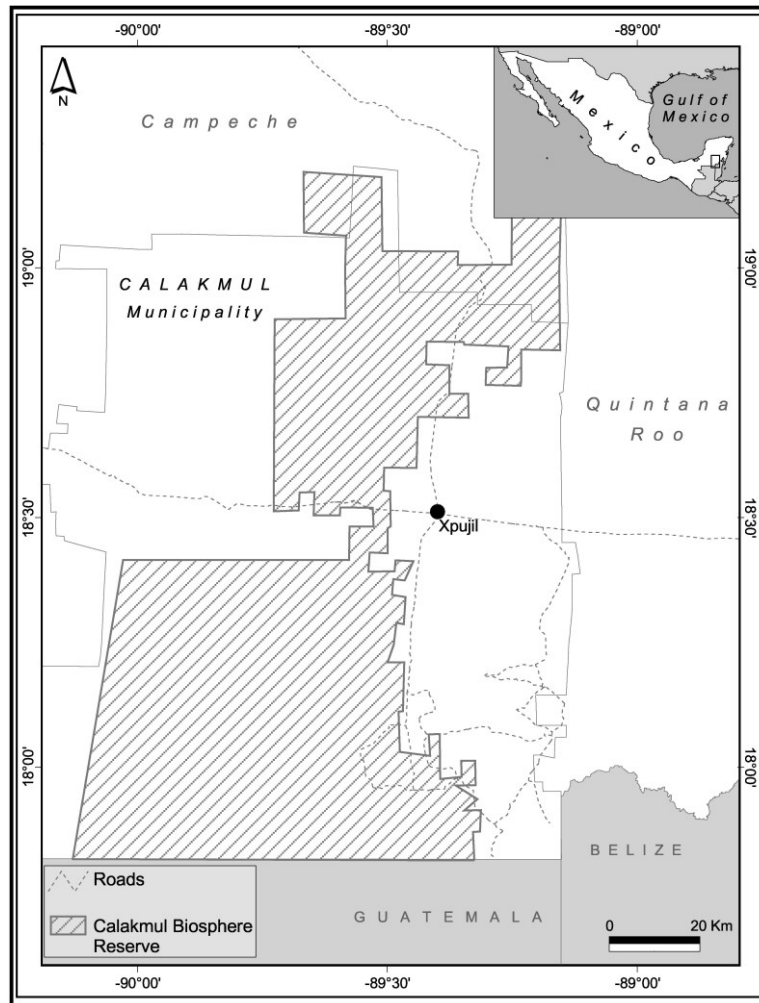


Figure 1. Study area. Calakmul sits on the meseta, the central karst uplands that form the Yucatan Peninsula's spine. Insert figure on the upper right corner shows the position of the study area in Mexico.

The region's forests are broadly classified as seasonally dry tropical forests (Pérez-Salicrup, 2004). A large area (723,185 ha) was declared a biosphere reserve in 1989, the Calakmul Biosphere Reserve. Deforestation rates in the areas adjacent to the reserve nowadays are low compared to the last century, and the principal cause of deforestation is small-scale cattle ranching. Though several communities still retain large expanses of forest, today only a few are granted the right of timber extraction. Forest resources are important for other economic activities, such as allspice, beekeeping, and ecotourism, which represent alternative incomes for communities (Turner et al., 2004). Conflicts around forest management and conservation have arisen in response to the divergent interests of actors over land and resources.

Because of the karstic nature of the region and a seasonal pattern of rainfall (Magaña et al., 1999), there are few permanent streams and water bodies. Precipitation patterns have become more spatially and temporally inconsistent during the last decades, mainly after the mid-1980s (Márdero et al., 2012). These biophysical characteristics present a challenging context for agricultural production, and in drought or hurricane years' harvests are often completely lost. Water is then the most limiting factor in the area, especially in the dry season, when people rely primarily on *aguadas* (waterholes) (Márdero et al., 2012). There are also large discrepancies between communities regarding water access. Over the years several governmental and non-governmental programs have been implemented to provide rainwater storage facilities to families, and some communities have benefitted from yearlong access through a pipeline situated near the highway or through deep wells. Water limitations and inequalities in water access have created tension in the region.

Calakmul hosts the largest population of jaguars (*Panthera onca*) in Mexico and is part of a Jaguar Conservation Unit (Sanderson et al., 2002). The region has also witnessed a notable increase in cattle husbandry over the last two decades. As opposed to crop production, cattle ranching is less vulnerable to drought and hurricane events and cattle act as a form of household savings. State subsidies and remittances also fostered pasture establishment and cattle ranching (Schmook and Radel, 2008). Depredation of cattle by jaguars and retaliation by farmers against jaguars have created conflicts surrounding jaguar management.

2.2. Data collection

While many other studies looking at subjective justice used predetermined definitions of justice and criteria, we wanted to understand how feelings of justice are constructed and defined, and against which criteria they are assessed in a particular context. We thus used a grounded approach to explore the context and perspectives of participants. We drew on long term engagement with local communities by two of the authors (SC and BS) and two years of immersion in local communities to observe and talk about environmental issues by another (MLL). To explore the construction of feelings of justice in depth, we selected two communities adjacent to the Calakmul Biosphere Reserve based on their level of collaboration with the reserve (see supp. material 1 for community selection). We assumed that the strength of the relationships with local conservation authorities in the region affected their feelings of fairness toward environmental management. Drawing on ethnographic methods, the first author spent

two weeks in each community to explore daily routines, livelihood activities and relationships with governmental institutions, and organize focus groups (see supp. material 1 for justification of focus groups). A reflexive field diary captured data from these sojourns, helping to direct the discussions during the focus groups as well as to support the thematic data analysis.

We organized two focus groups in each community: one with ‘farmers’ (focusing mainly on crop production; henceforth named groups F1 and F2) and one with ‘ranchers’ (focusing mainly on livestock production; henceforth named R1 and R2). Farmers and ranchers often perceive the use of natural resources differently; ranchers also have a different socioeconomic status, often being wealthier and having better representation at the local, regional and national levels (Gurri, 2006). We also focused on actors who had land rights in their community (*ejidatarios*), which can improve their sense of cohesion and facilitate information exchange in the group (Vaughn et al., 1996). Focus groups each lasted one to two hours and had between six and eleven local participants, including at least two women. We also asked ranchers for species and numbers of livestock owned and if they had experienced livestock depredation. We organized an additional focus group with sectoral representatives who sit at the Council of Rural and Sustainable Development in Calakmul (CMDRS), a regional multi-stakeholder management board, to see if further aspects would be identified during a multiple-actor focus group discussion (group MA). A total of five focus groups is generally considered adequate to reach data or theoretical saturation (Krueger, 2014; Morgan, 1997).

We used three examples of natural resource management as a starting point for discussion: forest, water, and jaguar management. These examples represent local actors’ concerns and potential biodiversity conflicts in the region (Lecuyer et al., in review), and their characteristics offer diverse opportunities to understand people’s construction of justice appraisal. The participants were invited to consider all resource uses and management options, including who should be involved in their management, and finally to reflect on their experiences and perceptions of the fairness of the management of these resources. The facilitator provided guidance, using open questions and image stimuli to develop the conversation, requesting detail on key issues and facilitating contributions by all participants (as suggested by Onwuegbuzie et al., 2009). At the end, the facilitator presented a summary of the issues identified by the participants for confirmation or clarification (Manning, 1997).

2.3. Data analysis

Our analysis was embedded in the philosophy of social phenomenology (Schutz, 1967) as we recognize the importance of both social relationships and social and temporal aspects of experience. In fact, we were interested in being able to interpret the subjective meaning of participants' feelings of justice toward environmental management. To analyse our data, we thus used a combination of deductive and inductive thematic analyses (see Fereday and Muir-Cochrane, 2006). Deductive analysis was employed in acknowledgement of previous research exploring the concept of fairness, which created a partially pre-determined structure to the investigation (Crabtree and Miller, 1992). However, we also pursued inductive exploration of the concept to enable new information or modification of previous knowledge to emerge (Boyatzis, 1998). Thematic analysis allowed us to collate and compare conversations around themes and examine variation between individuals and between groups (Guest et al., 2011). Specifically, we adapted the framework analysis described by Ritchie and Spencer (2002), with suggestions made by Rabiee (2004) for the focus group analysis, and included an additional stage of discourse analysis to interpret group interactions (supp. material 1).

The first stage (familiarization) included listening thoroughly to the audios and transcribing partially whilst making an early identification of the dimensions of justice (distributive, procedural, ecological, or others). The second stage (inductive and deductive coding of criteria of justice) consisted of developing a coding manual, indexing our text to *a priori* categories, identifying emergent new issues and refining the categories according to participant responses. In the third stage (contextualization and pattern of justice construction), we explored the interconnectedness of criteria, and uncovered the patterns and contexts in which they arose. The fourth stage (parallel coding of relational and directional aspects of feelings of injustice) represented an additional data indexing phase. We did not want to limit our investigation to the identification of criteria but rather to observe their variability and then create parallel coding in order to analyse with whom participants identified and who they perceived to be responsible in their construction of justice (see example in supp. material 2). The fifth stage (comparison of feelings of justice) was a charting phase in which we used comparative analysis to identify the differences in feelings of justice among individuals, groups, activities and communities. A final stage of analysis (analysis of group interactions) was undertaken to see if group interactions could add to the framework analysis and inform us about the level of group consensus or disagreement. Although presented as a linear, step-by-step procedure, the research analysis was an iterative and reflexive process. Finally, care was taken

to not take quotes out of context and to show where participants had different views; here we only offer short quotes, given word limitations.

3. Results

3.1. The dimensions of justice and associated criteria

The interest demonstrated by participants during focus group discussions confirmed the importance of perceptions of justice toward environmental management for local actors and validated the importance of four of the dimensions of justice presented above (section 1.1). Biodiversity conflicts were not only provoked by the (unfair) distribution of costs and benefits of environmental management (e.g. the cost of jaguar impact on livestock production), but were also reinforced by negative feelings toward the decision-making process, and failure to recognize their identity and knowledge or the importance of the natural environment. Our coding approach allowed us to identify, for the three cases presented, 16 criteria on which these feelings were based. Eight of these criteria had been defined *a priori*, two were modified from prior definitions in the literature and six emerged from the data (Appendix 1). These criteria can be used to operationalize the concept of fairness in Calakmul. However, it is important to be aware that criteria definition and priorities are likely to vary with context.

For distributive justice, the criteria used were related to merit, equality, and need. The principle of equality was ever present in the discourse of our participants at the individual and community levels, as every *ejidatario* originally received the same amount of land when *ejido* communities were created. This led participants to claim for the right to receive the same amount of support for environmental management. However, after group discussions, the participants agreed that other criteria related to distributive justice: “*Justice doesn’t mean that there is equality, but that one’s needs are met, or not (R1)*”. Most of our participants were poor and they also used the criterion of need to justify violating existing rules of environmental protection: “*I need to cultivate to live. It is not that felling a tree is just but I need to survive. There is a contradiction, they want us to care [for the environment], but they don’t want to help us. (...) Out of necessity, we do things we shouldn’t (R1)*”. They called for a higher consideration of their needs against environmental protection. Finally, under the equity criterion, participants agreed that the greater the engagement of an individual toward environmental protection, the higher the individual benefit should be: “*The person with most [conserved forest] is the one*

who should receive more [benefits] from conservation (F1)". However, some claimed the equity principle should rather apply to the amount of work engaged in their activity.

Procedural environmental justice proved as relevant as distributive environmental justice to participants. Several participants claimed that money was not the only issue, and discussed how decisions were made about environmental management, and how they felt left out: "*We aren't stupid. It [the government] decides rules and we cannot say anything (L.P.1)*". They discussed how they could be involved and treated in the environmental management processes (see criteria in Appendix 1).

Participants also showed real concern about the importance of the natural world, underlying the recognition of ecological justice: "*Although it can attack my flock, the jaguar has the right to live (L.P.2)*". Some participants expressed their feeling of responsibility toward non-human entities and towards future generations. In particular, the right to live in nature for jaguars and other wildlife was a point raised during every focus group.

Furthermore, local actors expressed concerns related to access to land rights and rules of use in *ejidos*. Demands for land use rights and for consideration as responsible and able land managers strongly underpinned our focus group discussions on justice. One participant expressed his frustration over land use rules: "*The government thinks it owns us (...) Here it's just land use right. (...) We can't progress without the permission of the government (R1)*". Limited property rights were one of the main concerns regarding environmental management, and villagers strongly demanded that their rights to act freely on their land be recognised. Finally, local actors demanded that no single interest and form of knowledge should dominate in environmental management. An unbiased approach was thus one of the criteria used to justify their feelings of justice.

3.2. Variability in the criteria definitions and uses across the dimensions of justice

Our use of example scenarios illustrated how actors do not use the same criteria in each case, because of variation in how they perceive natural resources. For example, the criterion of need dominated the discussion about water management, which actors perceive to be a basic need to which everyone is entitled. However, their perception of need varied regarding jaguar management: while some participants associated need with those having only a few animals, others associated it with the level of jaguar impact, regardless of livestock herd size. Also, for

those who believe it is possible to manage jaguars, they perceived merit as more important and argued that financial compensation and support related to jaguar attacks should be given in relation to individual management efforts to protect herds. Finally, forest was often perceived as an economic resource that should be shared equally between land-right owners, leaving non-*ejidatarios* with no right to access it.

Furthermore, criteria associated with procedural justice carried different meanings for each individual. Opportunity for representation might be articulated differently, as shown by concerns of this rancher: *“I am not prepared to take decisions for a village, so it is important to listen to the government's proposals, bring the communities in and decide together. Because we are not prepared to take that kind of decisions (R1)”*. Some might only want to participate in the determination of the priorities, while others want full representation in the decision-making process.

3.3. Variability of the criteria according to social scale of focus and participant activities and roles

Perception of justice also varied according to whether participant discourse was at the individual or community level. At an individual level, equality was considered one way to distribute benefit of forest resources. For example, each *ejidatario* of the community should receive the same amount of forest and support to use it. However, at a community level, the criterion of merit or effort was proposed for the payment of environmental services and forest conservation. For example, a community should deserve more support and payment if it protects a larger forest area. One of the community members commented that *“In Polo Norte [another community] they have 200 ha [of forest reserve] (...) and the ejidatarios receive money for it, and [here] we have 1000 [ha] but we don't receive anything (R2)”*.

The activities and roles of participants had some influence on their perception of justice. First, distinctions and comparisons were made, such as by this member of the multi-actor focus group: *“There is no program to protect [campesinos], besides the case of ranchers. The rancher always has an advantage, unfortunately. He is the one harming the most [the environment], but the one who receives the most; the farmer no (MA)”*. Further comments made by farmers regarding consistency in decision-making sometimes originated from their perception of ranchers as a privileged group, receiving more help and consideration in decision-making

processes. Farmers also gave more importance to the jaguar's right to live than ranchers while discussing jaguar management. However, they made a parallel with the situation of ranchers regarding jaguar management in describing their own difficulty with wild herbivores consuming and destroying their crops: "*They [herbivores] are also affecting me, and it can become a tremendous problem to protect my property. Right now, I don't have anything to defend myself, so the animal should not live. What is the most valuable? The life of the animal or the life of my family? (F1)*". For those detrimental herbivores, farmers were less inclined to talk about their right to live.

3.4. Variability in the criteria according to whom participants perceived to be responsible

Attribution of responsibility at different institutional levels also impacted participants' construction of justice appraisal and the magnitude of their feelings of (in)justice. For example, local actors were generally aware of international efforts and projects for forest protection, and perceived the Mexican government as the authority in charge of this resource: mistrust, non-neutrality, disrespect, and lack of representation or consistency between individuals were strongly responsible for their feelings of injustice toward how the government handles forest management. The following quote represent their perception of international help: "*We agree on protecting trees; it costs us dear to fell trees. But they receive millions of dollars and supposedly this money is for those who protect trees, but that money never gets here, we don't receive it (R1)*". Water management was perceived to be the responsibility of regional authorities and allegations of mistrust were less common. Which government entity is responsible for wildlife management seemed uncertain, and people often mistook those in charge of different programs: the reserve, for example, was thought to be in charge of the compensation scheme for depredation, and frustration against the program was then redirected toward the reserve. Such confusion can explain why the levels of collaboration with the reserve did not appear to affect people's construction of justice appraisal, as they did not know to whom they should attribute responsibility for the costs and benefits of conservation.

Perceptions regarding procedural justice were also dependent on the role of individuals: some actors who were currently or had been a village head spoke more about unfairness at higher institutional decision levels. Overall, differences between actors did not create much dissent within the focus groups. Even in the multi-actor group, actors seemed to reach

consensus and share perspectives of justice built on a common identity, as *campesinos* with little income and education, from isolated communities in Mexico, having as a common ‘enemy’ the government that does not take their concerns into consideration. In fact, one participant said: “*They [the government] should recognize our right, and come here to see [our] reality. Governments are not interested in this right; what interests them is to get the power, enjoy [it], and take everything they can, and leave (M.A)*”.

4. Discussion

Our study addresses recent calls to integrate the notion of fairness into conservation practice (Gross, 2011), and aims to develop a framework to support practitioners in assessing justice in conservation that is sensitive to the local context (Martin et al., 2015) and useful in managing biodiversity conflicts.

4.1. Dimension of justice, criteria, and source of variation

To improve biodiversity conflict management, it is important to understand strategic and local prioritization of criteria (Sikor et al., 2014). In this research, we identified different criteria associated with how people build their feelings of justice regarding the management of different resources. The majority of those criteria are similar to justice principles documented in previous research, including in other fields (see Appendix 1 for a list of references). Our qualitative approach gives deep insight into actors' perceptions of justice and allows us to explore the definitions of criteria by our participants, which is critical to understand typical variations in local context (Martin et al., 2014, 2015; Sikor et al., 2014). We show how their different perceptions of natural resources call for different approaches to answer to their claim for justice. For instance, water management could be addressed by a basic needs threshold approach (see Martin et al., 2015) to reflect the moral imperative that focus groups articulated toward this resource. Forest management might be addressed by a market-based approach, though the issue of inequality among community members will have to be tackled (*ejidatario* vs. *non-ejidatario*; see Navarro-Olmedo et al., 2016). In addition, while it is possible to extract some general criteria on which people build their perception of justice, the conception of these criteria might differ among people. Consequently, while criteria are useful to understand the construction of justice, we warn against using our criteria list as a pre-established set of criteria to evaluate

justice in other contexts. We agree with Sikor and colleagues (2014) that context matters and we emphasize the need for more empirical casework on local and global conceptions.

Our research allows identifying some of the contextual sources of variation among the different criteria used by our participants, such as the social scale of focus and whom they perceive as responsible for the injustice. In fact, the debate on environmental justice has evolved from a focus on individual interest to one that addresses justice at both the individual and community level (Gross, 2011; Martin et al., 2016; Müller, 2011; Schlosberg, 2013). Our results support previous suggestions (Kahn et al., 1982) that the social scale of focus influences criteria: while at an individual level some criteria prevail, in situations where people identify at the community level, they will opt for other criteria that seem fairer for the collective. Furthermore, at an individual level, who they principally identify with, and who they blame for injustice also leads to differences in arguments over justice that might result in biodiversity conflict (Clayton, 2000).

4.2. Broadening the scope of procedural justice: from procedure to process

Procedural justice is usually investigated under one particular environmental decision-making process (e.g., Gustavsson et al., 2014; Lauber, 1999). In this study, we rather focused on multiple issues, and people expressed justice concerns about the general process of environmental management and the resulting biodiversity conflicts. For example, criteria of trust and respect applied on an everyday basis to all interactions between actors involved in environmental management. Contrary to other studies, where interpersonal treatment was related to interactional justice as a dimension of justice independent from others (Bies et al., 2001), our participants directed their anger not toward individuals, but against institutions; interpersonal treatment then still related to procedural justice (Cohen-Charash and Spector, 2001). For example, in the case of corruption, our participants agreed that it is the administration that should not allow corruption to happen, instead of individuals. People's perception of the level of corruption and lack of integrity and neutrality in administration and decision-making influences how people construct their perception of justice. We are not trying to establish an argument for the need to make a distinction between interactional and procedural justices, and while the former might be pertinent in other cases, concerns toward interactional justice were not articulated by our participants. Feelings of (in)justice toward interpersonal treatment were

related mostly to the enactment of environmental management processes, which occupies the area of procedural justice (Mikula et al., 1990).

We propose instead to broaden the scope of claims relative to procedural justice not only to procedure, which refer to established and official ways of taking decisions (Madden and McQuinn, 2014), but to every process of environmental management. Processes, as proposed by Madden and McQuinn (2014), refer to “the series of actions to achieve a goal”, in this case environmental protection, and allow for more flexibility to incorporate participants’ concerns. For example, whilst the process and outcome could be fair, implementation of the decision might be perceived unfair (Ohl et al., 2008). One farmer criticized the “lack of action” of other local actors: *“The problem is that if you come here, see my needs and help me, and come back to see that nothing has changed, it is not fair either that I did not do my part. It is important to respect the decisions made (F2).”* Compliance, i.e. respect of decisions and their further enforcement, was thus an important criterion to further explain people’s feelings of justice. This conceptualization of procedural justice corresponds more to an adaptive form of management where decisions are continually questioned and revised (Plummer, 2009). Defining procedural justice as the overall fairness of the processes of environmental management allows us to consider not only the decision-making processes but also decision implementation and appeal, particularly when corruption, or perceived corruption, exists.

4.3. Ecological justice and justice-as-recognition as distinctive dimensions

This research is innovative in the way that it both explores literature considering ecological justice as a dimension of justice that stand alone (Clayton, 2000) and literature on justice-as-recognition that incorporates the notion of ecological justice (Jacobsen and Linnell, 2016; Martin et al., 2016; Schlosberg, 2007). In fact, the right to live of animals might be fully recognized in some cultures, and ecological justice could then overlap with justice-as-recognition. In our study, participants had migrated from other states and did not articulate specific cultural identity based on ethnicity, but rather identity in relation to roles and agrarian livelihoods (as in Martin et al., 2014). Recognition was then mostly articulated around the need to acknowledge a particular lifestyle (e.g. rural lifestyle versus urban lifestyle) and see current land holders as “good stewards of the land” (Olive, 2016). This is well captured by this participant’s memory: *“I think of my father a lot; he was a hunter and a fisherman. It wasn’t a crime to commercially sell fish and meat, or nothing of this kind at the time. (...) And the*

animals never went extinct. And it was a way of life. And what has happened now? Now, as everything is a crime, we can't live (M.A.)". Their claims for fairness stand in recognizing their knowledge and practice as relevant and potentially compatible with environmental management and refusing a dominant conception of conservation that potentially prevents them from natural resource utilisation.

However, claims for more recognition did not always coincide with claims of ecological justice, such as intrinsic rights for nature or personal responsibility for its conservation. Attributing intrinsic value to the natural environment has led people to acknowledge macro-justice arguments that emphasize societal concerns, interdependence and responsibility (Clayton et al., 2016); it also influences attitudes toward environmental protection (Opatow, 1994). It needs not to be associated with a particular culture or way of living and seeing the world; care for nature has been proposed as a "unifying common dominator" among different perceptions of the world (see the notion of stewardship in Lute and Gore, 2014). Ecological justice should then be addressed differently than justice-as-recognition: environmental managers can encourage people to think collectively about their relationship to the natural world.

4.4. Conceptualisation of conditional and practical justices

Our combined deductive and inductive empirical approach allowed us to understand local perceptions of justice and propose a framework representing how people construct their feelings of justice regarding environmental management in the region of Calakmul (figure 2). While there is no causal link between the dimensions of justice and each dimension can interact with each other, we propose to distinguish two broad categories of justice: conditional justice (justice-as-recognition and ecological justice) and practical justice (distributive and procedural justices). We do not consider justice-as-recognition to be on the same analytical level as the other dimensions of justice, but rather one that is salient to every other dimension. In fact, recognition allows for questioning whose values matter in the perception of costs and benefits, whose knowledge counts in the decision-making process (Martin et al., 2013), and generally who is a legitimate source of justice norms (Whiteman, 2009). Justice-as-recognition allows to acknowledge the different ways of knowing nature and prevents us from imposing a dualist thinking between society and nature (Martin et al., 2013). Additionally, we advocate to conceptualize ecological justice as a distinct conditional justice in order to support collective

thinking about our relationship to nature. How people perceive the rights of species and the responsibilities towards the natural world and future generations will determine who they include in their scope of justice (Opatow, 1994; Parris et al., 2014). By placing ecological justice as a condition of distributive and procedural justices, we widen the perspective on social justice by also including consideration of justice for 'nature' itself. Procedural and distributive justices, in turn, address more the question of environmental management in practice, and what can be fair in the daily process of environmental management and the distribution of its costs and benefits.

In other words, justice-as-recognition allows not to determine what is fair or unfair, but to acknowledge that there are different conceptions of justice among individuals that reflect different ways of knowing the world (Martin et al., 2013); then, ecological justice is about how to incorporate the natural world in the scope of justice (Clayton, 2000), while practical justice, procedural and distributive, interact in order to define fair procedures and distribution. The arrangement in figure 2 of the dimensions of justice recognise their interaction so that the fulfilment of one dimension will not compensate for the lack of consideration of another (Schlosberg, 2007). This framing could avoid negative effects found previously, in which attempts to reach a compromise in procedural and distributional fairness failed because the relevant actors were not included, new power-imbalances were introduced, or compromises were not implemented at the appropriate scale (Martin et al., 2013, 2015; Neumann, 2004). Furthermore, supporting interventions that reinforce values and attachment to nature could help reconcile environmental integrity and social justice, and demonstrate how environmental considerations are fundamental in creating the conditions for social justice.

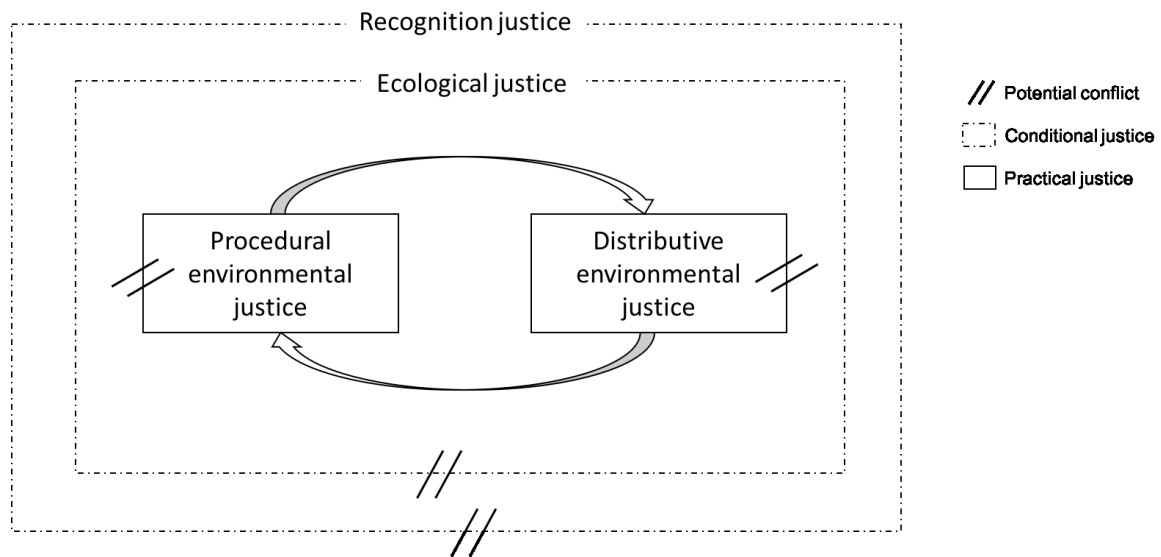


Figure 2. Framework representing the construction of justice appraisal in association with biodiversity conflicts.

5. Conclusion: the importance of the plurality of justice perceptions

This study offered innovative insights on the feelings of justice and their implications for environmental management. Perceptions of justice have been recognized to affect environmental attitudes and behaviour, and it has been proposed that different perceptions could be at the origin of most biodiversity conflicts (Whiteman, 2009). Our findings demonstrate that practitioners and researchers working in conservation must be aware of competing fairness perceptions, to avoid some actors feeling excluded and developing animosity against environmental managers. In Calakmul area, the criteria of justice and the basis for their variation we identified could help local practitioners modify their approach to environmental issues in order to improve the perception of justice in environmental management. For example, clarity over authority for the depredation compensation program or transparency regarding international funding for ecosystem services could assist in addressing some of the frustration that participants expressed against the Reserve. However, these feelings are so situation dependent and complex that we believe using our predetermined set of criteria in other contexts would be counterproductive. There is no simple tool box that will allow us to address justice concerns everywhere; thus, empirical qualitative approaches should be reproduced as a starting point. In doing so, our major research outcome was to open a space for dialogue among local actors and to support the process of developing a mutual understanding.

Our pluralist approach led us to develop a broad framework offering a realignment of principles, and context for practical action, which can guide practitioners and researchers in understanding and accommodating the place that ‘feelings of justice’ occupies in addressing biodiversity conflicts. Future studies could use this broad framework to compare the construction of justice and the origin of the variation of people feelings of justice which might lead to further modifications or incorporation of other justice dimensions (e.g., interactional justice; Bies et al., 2001; cognitive justice; Coolsaet, 2016). Our framework recognizes the importance of people’ feelings of fairness, but also of the need to consider the natural environment when undertaking ‘fair’ environmental management. It thus reemphasizes that sustainable development should not be perceived as a goal but rather as a process that recognizes the “interconnectedness of environmental integrity and social justice” (Ferraro et al., 2011, p. 72). The pursuit of sustainable development will then include examination of what different justice perspectives represent, how to adjudicate among them, and how to reconcile conflicting perspectives in democratic processes. Acknowledging justice-as-recognition and developing a sense of ecological justice among groups will help to develop strategies that align with fair procedural and distributive justices for communities and their natural surroundings.

6. Acknowledgments

This research would not have been possible without the kind support of numerous people in Calakmul who shared their knowledge. We would like to thank Rodrigo Salguero for his assistance during the focus groups, Geneviève Lajoie, Adriana Aguilar Melo and two anonymous reviewers for their constructive comments, and Sandra Piña Romero and Malek Ouahes for reviewing material in Spanish and English. Funding was provided by MITACS through a Globalink Research Award to MLL, BS and SC, a José-Sarukhan Excellence Award given by the Centro del Cambio Global y Sustentabilidad del Sureste to MLL, an Excellence Award from the Quebec Center for Biodiversity Science to MLL, and a grant from the Université de Sherbrooke to SC.

7. References

Agyeman, J., Schlosberg, D., Craven, L., Matthews, C., 2016. Trends and directions in environmental justice: from inequity to everyday life, community, and just sustainabilities.

Annu. Rev. Environ. Resour. 41.

Barrett-Howard, E., Tyler, T.R., 1986. Procedural justice as a criterion in allocation decisions. *J. Pers. Soc. Psychol.* 50, 296-304.

Bies, R.J., 1987. Beyond "voice": The influence of decision-maker justification and sincerity on procedural fairness judgments. *Represent. Res. Soc. Psychol.* 17, 3-14.

Bies, R.J., Greenberg, J., Cropanzano, R., 2001. Interactional (in)justice: The sacred and the profane. In *Advances in Organizational Justice*, ed. J Greenberg, R Cropanzano. Stanford Univ. Press, Stanford, CA.

Boyatzis, R.E., 1998. *Transforming qualitative information: Thematic analysis and code development*. Sage, Thousand Oaks, CA.

Čapek, S.M., 1993. The "environmental justice" frame: A conceptual discussion and an application. *Soc. Probl.* 40, 5–24.

Clayton, S., 2000. New ways of thinking about environmentalism: Models of justice in the environmental debate. *J. Soc. Issues* 56, 459–474.

Clayton, S., Kals, E., Feygina, I., 2016. Justice and Environmental Sustainability, in: Sabbagh, C., Schmitt, M. (Eds.), *Handbook of Social Justice Theory and Research*. Springer, New York, pp. 369–386.

Cohen-Charash, Y., Spector, P.E., 2001. The role of justice in organizations: A meta-analysis. *Organ. Behav. Hum. Decis. Process.* 86, 278–321.

Cohen, R.L., 1985. Procedural justice and participation. *Hum. Relat.* 38, 643–663.

Coolsaet, B., 2016. Towards an agroecology of knowledges: Recognition, cognitive justice and farmers' autonomy in France. *J. Rural Stud.* 47, 165–171.

Crabtree, B.F., Miller, W.F., 1992. *A template approach to text analysis: developing and using codebooks*. Sage, Newbury Park, CA.

Dawson, N., Martin, A., Danielsen, F., 2017. Assessing equity in protected area governance: Approaches to promote just and effective conservation. *Conserv. Lett.* doi:10.1111/conl.12388

Deutsch, M. 2011. Justice and conflict. in: Deutsch, M. and P. Coleman (Eds.) *The handbook of conflict resolution: theory and practice* (eds. Deutsch, M. and P. Coleman). Jossey-Bas Publishers, San Francisco, CA, pp. 41-64.

Deutsch, M., 1985. *Distributive justice: A social-psychological perspective*. Yale University Press, New Haven, CT.

Deutsch, M., 1975. Equity, equality, and need: What determines which value will be used as the basis of distributive justice? *J. Soc. Issues* 31, 137–149.

Ericson, J., Freudenberger, M.S., Boege, E., Brewster, D., Gardner-Outlaw, T., Engelman, R., Turshen, M., Domatob, J.K., Hartmann, B., Bosnjakovic, B., 1999. Population dynamics migration and the future of the Calakmul Biosphere Reserve. *BMJ* 319, 651–2.

Fereday, J., Muir-Cochrane, E., 2006. Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *Int. J. Qual. Methods* 5, 80–92.

Ferraro, E., White, R., Cox, E., Bebbington, J., Wilson, S., 2011. Craft and sustainable development: reflections on Scottish craft and pathways to sustainability. *Craft Plus Des. Enq.* 3, 1–26.

Fraser, N., 2001. Recognition without ethics? *Theory Cult. Soc.* 18, 21–42.

Gross, C., 2011. Why justice is important. *Basin Future. Water Reform Murray-Darling Basin* 149–62.

Guest, G., MacQueen, K.M., Namey, E.E., 2011. *Applied thematic analysis*. Sage, London, UK.

Gurri, F. D., 2003. Fecundidad y Estrategias Adaptativas en Familias Campesinas de Calakmul Campeche. *Estudios de Antropología Biológica* 11, 113-138.

Gurri, F. D., 2006. 25 Años de Colonización: Sobreviviendo y Garantizando el Futuro en Calakmul. *Ecofrontera* 28, 2-6.

Gustavsson, M., Lindström, L., Jiddawi, N.S., de la Torre-Castro, M., 2014. Procedural and distributive justice in a community-based managed Marine Protected Area in Zanzibar, Tanzania. *Mar. Policy* 46, 91–100.

INEGI (2015) “Encuesta Intercensal 2015”,
<http://www.beta.inegi.org.mx/proyectos/enchogares/especiales/intercensal/>

Jacobsen, K.S., Linnell, J.D., 2016. Perceptions of environmental justice and the conflict surrounding large carnivore management in Norway—Implications for conflict management. *Biol. Conserv.* 203, 197–206.

Ittner, H., Ohl, C., 2005. Playing Fair within Climate Protection Policy?-Bringing Together Psychological and Economic Methods, in: *Bringing Together Psychological and Economic Methods* (June 1, 2005). IACM 18th Annual Conference.

Kahn, A., Nelson, R.E., Gaeddert, W.P., Hearn, J.L., 1982. The justice process: Deciding upon equity or equality. *Soc. Psychol. Q.* 3–8.

Kals, E., Russell, Y., 2001. Individual conceptions of justice and their potential for explaining proenvironmental decision making. *Soc. Justice Res.* 14, 367–385.

Kellerhals, J., Modak, M., Perrenoud, D., 1997. *Le sentiment de justice dans les relations sociales*, Presses universitaires de France. ed., Paris.

- Krueger, R.A., 2014. Focus groups: A practical guide for applied research. Sage publications.
- Lauber, T.B., 1999. Measuring fairness in citizen participation: a case study of moose management. *Soc. Nat. Resour.* 12, 19–37.
- Leventhal, G.S., 1980. What should be done with equity theory? New approaches to the study of fairness in social relationships. in: K. S. Gergen, M. S. Greenberg, & R. H. Willis (Eds.), *Social exchange: Advances in theory and research*. Plenum Press, New-York, pp. 27-55.
- Lind, E.A., Tyler, T.R., 1988. *The social psychology of procedural justice*. Plenum Press, New York.
- Loomis, D.K., Ditton, R.B., 1993. Distributive justice in fisheries management. *Fisheries* 18, 14–18.
- Lute, M.L., Gore, M.L., 2014. Stewardship as a path to cooperation? Exploring the role of identity in intergroup conflict among Michigan wolf stakeholders. *Hum. Dimens. Wildl.* 19, 267–279.
- Peréz-Salicrup, D., 2004. Forest types and their implications. In B. L. Turner , J. Geoghegan, & D. R. Foster (Eds.), *Integrated land-change science and tropical deforestation in the southern Yucatán*. Oxford University Press, New-York. pp. 63–80.
- Madden, F., McQuinn, B., 2014. Conservation’s blind spot: the case for conflict transformation in wildlife conservation. *Biol. Conserv.* 178, 97–106.
- Magaña, V., Amador, J., Medina, S., 1999. The midsummer drought over Mexico and Central America. *Journal of Climate*, 12, 1577–1588.
- Manning, K., 1997. Authenticity in constructivist inquiry: Methodological considerations without prescription. *Qual. Inq.* 3, 93–115.
- Márdero, S., Nickl, E., Schmook, B., Schneider, L., Rogan, J., Christman, Z., Lawrence, D., 2012. Sequías en el sur de la península de Yucatán: análisis de la variabilidad anual y estacional de la precipitación. *Investig. Geográficas* 19–33.
- Marshall, K., White, R., Fischer, A., 2007. Conflicts between humans over wildlife management: on the diversity of stakeholder attitudes and implications for conflict management. *Biodivers. Conserv.* 16, 3129–3146.
- Martin, A., Akol, A., Gross-Camp, N., 2015. Towards an explicit justice framing of the social impacts of conservation. *Conserv. Soc.* 13, 166–178.
- Martin, A., Coolsaet, B., Corbera, E., Dawson, N.M., Fraser, J.A., Lehmann, I., Rodriguez, I., 2016. Justice and conservation: The need to incorporate recognition. *Biol. Conserv.* 197, 254–261.
- Martin, A., Gross-Camp, N., Kebede, B., McGuire, S., Munyarukaza, J., 2014. Whose

environmental justice? Exploring local and global perspectives in a payments for ecosystem services scheme in Rwanda. *Geoforum* 54, 167–177.

Martin, A., McGuire, S., Sullivan, S., 2013. Global environmental justice and biodiversity conservation. *Geogr. J.* 179, 122–131.

McShane, T.O., Hirsch, P.D., Trung, T.C., Songorwa, A.N., Kinzig, A., Monteferri, B., Mutekanga, D., Van Thang, H., Dammert, J.L., Pulgar-Vidal, M., others, 2011. Hard choices: making trade-offs between biodiversity conservation and human well-being. *Biol. Conserv.* 144, 966–972.

Mikula, G., Petri, B., Tanzer, N., 1990. What people regard as unjust: Types and structures of everyday experiences of injustice. *Eur. J. Soc. Psychol.* 20, 133–149.

Morgan, D.L., 1997. *Focus groups as qualitative research*. Sage, London, UK.

Müller, M.M., 2011. Justice as a framework for the solution of environmental conflicts, in: *Justice and Conflicts*. Springer, pp. 239–250.

Navarro-Olmedo, S., Haenn, N., Schmook, B., Radel, C., 2016. The Legacy of Mexico's Agrarian Counter-Reforms: Reinforcing Social Hierarchies in Calakmul, Campeche. *J. Agrar. Change* 16, 145–167. <https://doi.org/10.1111/joac.12095>

Negi, C.S., Nautiya, S., 2003. Indigenous peoples, biological diversity and protected area management—policy framework towards resolving conflicts. *Int. J. Sustain. Dev. World Ecol.* 10, 169–179.

Neumann, R.P., 2004. Moral and discursive geographies in the war for biodiversity in Africa. *Polit. Geogr.* 23, 813–837.

Ohl, C., Stickler, T., Lexer, W., Beckenkamp, M., Risnoveanu, G., Geamana, N., Fischer, A., Fiorini, S., Dumortier, M., Casaer, J., 2008. Governing biodiversity: procedural and distributional fairness in complex social dilemmas, in: *The 12th Biennial Conference of the International Association for the Study of Commons*, 14-18 July 2008. p. 31.

Olive, A., 2016. It is just not fair: the Endangered Species Act in the United States and Ontario. *Ecol. Soc.* 21

Onwuegbuzie, A.J., Dickinson, W.B., Leech, N.L., Zoran, A.G., 2009. A qualitative framework for collecting and analyzing data in focus group research. *Int. J. Qual. Methods* 8, 1–21.

Opotow, S., 1994. Predicting protection: Scope of justice and the natural world. *J. Soc. Issues* 50, 49–63.

Paavola, J., 2004. Protected areas governance and justice: theory and the European Union's Habitats Directive. *Environ. Sci.* 1, 59–77.

Parris, C.L., Hegtvedt, K.A., Watson, L.A., Johnson, C., 2014. Justice for all? Factors

- affecting perceptions of environmental and ecological injustice. *Soc. Justice Res.* 27, 67–98.
- Plummer, R., 2009. The Adaptive Co-Management Process: an Initial Synthesis of Representative Models and Influential Variables. *Ecol. Soc.* 14 (2), 24. <http://www.ecologyandsociety.org/vol14/iss2/art24/>.
- Rabiee, F., 2004. Focus-group interview and data analysis. *Proc. Nutr. Soc.* 63, 655–660.
- Rawls, J., 1971. *A theory of justice*. Harvard university press, Cambridge, MA.
- Reese, G., Jacob, L., 2015. Principles of environmental justice and pro-environmental action: A two-step process model of moral anger and responsibility to act. *Environ. Sci. Policy* 51, 88–94.
- Ritchie, J., Spencer, L., 2002. Qualitative data analysis for applied policy research. *Qual. Res. Companion* 573, 305–329.
- Sanderson, E.W., Redford, K.H., Chetkiewicz, C.-L.B., Medellin, R.A., Rabinowitz, A.R., Robinson, J.G., Taber, A.B., 2002. Planning to save a species: the jaguar as a model. *Conserv. Biol.* 16, 58–72.
- Schlosberg, D., Carruthers, D., 2010. Indigenous struggles, environmental justice, and community capabilities. *Glob. Environ. Polit.* 10, 12–35.
- Schlosberg, D., 2013. Theorising environmental justice: the expanding sphere of a discourse. *Environ. Polit.* 22, 37–55.
- Schlosberg, D., 2007. *Defining environmental justice*. Oxford: Oxford University Press.
- Schutz, A., 1967. *The phenomenology of the social world*. Northwestern University Press, Evanston, IL.
- Shoreman-Ouimet, E., Kopnina, H., 2015. Reconciling ecological and social justice to promote biodiversity conservation. *Biol. Conserv.* 184, 320–326.
- Sikor, T., Martin, A., Fisher, J., He, J., 2014. Toward an empirical analysis of justice in ecosystem governance. *Conserv. Lett.* 7, 524–532.
- Smith, P.D., McDonough, M.H., 2001. Beyond public participation: Fairness in natural resource decision making. *Soc. Nat. Resour.* 14, 239–249.
- Syme, G., Nancarrow, B.E., 2012. *Justice and the allocation of natural resources: Current concepts and future directions*. Oxford University Press, New York, NY.
- Turner, B.L., Geoghegan, J., Foster, D.R., 2004. *Integrated land-change science and tropical deforestation in the southern Yucatán: Final frontiers*. Oxford Geographical and Environmental Studies. Oxford University Press, Oxford.
- Tyler, T.R., 1988. What is procedural justice-criteria used by citizens to assess the fairness of

legal procedures. *Law Soc Rev* 22, 103.

Van den Bos, K., Lind, E.A., Vermunt, R., Wilke, H.A., 1997. How do I judge my outcome when I do not know the outcome of others? The psychology of the fair process effect. *J. Pers. Soc. Psychol.* 72, 1034.

Vaughn, S., Schumm, J.S., Sinagub, J.M., 1996. *Focus group interviews in education and psychology*. Sage, Thousand Oak, CA.

Walker, G., 2012. *Environmental Justice: concepts, evidence and politics*. Abingdon, Routledge.

Walker, G., 2009. Beyond distribution and proximity: exploring the multiple spatialities of environmental justice. *Antipode* 41, 614–636.

Whiteman, G., 2009. All my relations: Understanding perceptions of justice and conflict between companies and indigenous peoples. *Organ. Stud.* 30, 101–120.

Yearley, S., 2005. Scientific proofs and international justice: Why “universal” standards of scientific evidence can undermine environmental fairness, in: *Proceedings of the Conference: Scientific Proofs and International Justice: The Future for Scientific Standards in Global Environmental Protection and International Trade*. April 12 2005, Sociology Studies Unit, University of Minho, Braga, Portugal.

Appendix 1

Table 1. Coding manual elaborated to analyse the discourse of focus groups' participants. In the Code column, modified definitions are in italics, and new definitions that emerge from our empirical data are in bold. References indicate previous literature identifying certain definitions of justice. Quotes are examples from our empirical data illustrating the forms of justice appraisal.

Theme	Code	Description	References	Quote
Distributive environmental justice: the fair distribution of costs and benefits related to environmental management	Merit	The higher the individual contribution to the common goal, the greater the individual benefit should be and vice versa, such that individual inputs and outputs are balanced.	Ittner and Ohl, 2005; Kellerhals et al., 1997; Ohl et al., 2008	<i>"The person with most [forest] is the one who should receive more [benefits] from conservation (F1)"</i>
	Equality	All people should be treated alike, disregarding their differences in need or merit, such that a uniform distribution of the cost and benefits is achieved.	Ittner and Ohl, 2005; Kellerhals et al., 1997; Ohl et al., 2008	<i>"The money paid for environmental services to [protect] the forest should be the same for all ejidatarios, regardless of their [specific] needs (F1)"</i>
	Need	A higher contribution should be given to the people who are the most dependent on the resource in question, or a smaller contribution should be offered to those who have more resources.	(Ittner and Ohl, 2005; Kellerhals et al., 1997; Ohl et al., 2008)	<i>"It depends on the needs of those who need it the most." While another participant added "It depends on how big the family is. (R2)"</i>
Procedural environmental justice: the fairness of the processes of environmental management (decision-making, action implementation)	Representation	Representation of different point of view in the decision-making process	(Leventhal, 1980; Tyler, 1988)	<i>"The campesino should be asked to say something and the ejidos' opinions should be taken into account. [...] They take decisions without knowing and are outsiders. Decisions should be taken here [in the region] (R2)"</i>
	Consistency	The consistency with which a procedure is applied across time and individuals.	(Barrett-Howard and Tyler, 1986; Leventhal, 1980)	<i>"There is a lot of favouritism, they [government] agree with the ejidal commissary (apart) and they say, we're gonna give you that much today. Or, the ejidal commissary brings together the majority of his followers; for example, if there are 20, he brings 11 persons together and splits the money among them, and the other people who should also benefit are not taken into account. (MA)"</i>
	<i>Respect</i>	<i>The respect with which participants are treated by the authorities responsible.</i>	(Tyler, 1988)	<i>"They [the government] do not respect the information we give them; they decide everything over there (R2)"</i>
	<i>Trust</i>	<i>The trustworthiness of the authorities responsible.</i>	(Tyler, 1988)	<i>"Let's take the decisions the way we are doing it right now, face to face, looking into the eyes, feeling that there is trust, that you are talking with the truth and not planning little truculent projects. (F1)"</i>

	Opportunity for revision	The existence of opportunities to appeal or modify a decision after it is taken.		<i>"And what do we do if we do not agree with the decision? We cannot do anything. (R1)"</i>
	Compliance	Acquiescence to the decision made		<i>"The problem is that if you come here, see my needs and help me, and come back to see that nothing has changed, it is not fair either that I did not do my part. It is important to respect the decisions made (F2)."</i>
Ecological justice: the fair and respectful treatment of the natural environment.	Right of the environment	Intrinsic right of every part of the environment to exist.	(Clayton, 2000)	<i>"It is unfair to the animal, wild animal... It would be unfair to kill them, there are free too (F2)."</i>
	Responsibilities to other species	Human obligations to fairly treat non-human species in a way that does not threaten their survival in their natural world.	(Clayton, 2000)	<i>"When we fell trees from the forest to cultivate, it is unfair for animals; we harm them (F2)."</i>
	Responsibilities to future generations	Human obligations to maintain a world where future generations will have the same opportunities to benefit from natural resources as the current generation.	(Clayton, 2000)	<i>"It is unfair if jaguars disappear, because, for instance, we are here today but young people, children are following. Maybe they won't know it. it is unfair to the next generation [to see jaguar] on a picture or on the internet (R2)".</i>
Justice-as-recognition: acknowledging individuals' rights, values, cultures and knowledge systems	Land-use and land rights	The ability to make decisions over land use on one's own land, or if restricted to be given alternative land		<i>"Justice for me it to be able to do what I want if I am on my land, because we leave him his house [the jaguar], what they call protected area. If we are in the protected area, get us out of here and give us another place to live". (R1)</i>
	Knowledge	The recognition of different knowledges, including local knowledge		<i>"It's important the information they use, because who knows best about its own house that those who live here. I know the knowledge I have that people from the city don't have."</i> While another precise example was: <i>"We need a technician from here, who can get information more true, who know the people, who know what is happening here. This will give information more reliable and more complete" (F1)</i>
	Plurality of interests	Recognition of the validity and equality of different interests		<i>"In reality, them, if you don't negotiate with them, others will come to negotiate larger project, and the teeny weeny one who no one will defend, is not going to have anything." (MA)</i>
	Neutral approach	No preconceived idea of what the decision should be		<i>"Sometimes, they come and say they're going to listen, but they already know what is going to be the final decision." (R1)</i>