



Environmental justice in coastal systems: Perspectives from communities confronting change

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ABSTRACT

Life in the Pacific is characterised by interconnected, fast and slow socio-ecological change. These changes inevitably involve navigating questions of justice, as they shift who benefits from, owns, and governs resources, and whose claims and rights are recognized. Thus, greater understanding of perceptions of environmental justice within communities will be crucial to support fair adaptation. We contend that an environmental justice approach offers a theoretical foundation to help illuminate key concerns and trade-offs as communities navigate global change. Here, we apply an empirical environmental justice lens to the use and customary management of coastal resources in Papua New Guinea. Through two case studies, we examine perceptions of distributional, procedural and recognitional justice. We find similarities and differences. There were common concerns about the injustice of unequal fishing pressure and destructive methods, but in one case, concerns about people's material needs overrode concerns about non-compliance and unequal costs. In the other case, deliberative decision-making served as a platform for not only negotiating and re-defining the distribution of costs and benefits, but also airing grievances, thereby strengthening recognition of different people's values and concerns. In addition, we find that recognitional aspects of justice, such as respect, can confer or undermine the legitimacy of procedures for governing resources and thus making fair decisions about distribution. The heterogeneity of justice criteria in our cases emphasizes the need to elicit and understand plural justice perceptions in different contexts.

1. Introduction

Life in the Pacific is characterised by interconnected, fast and slow socio-ecological change. Coastal communities across the Pacific face vast environmental changes including sea-level rise, coastal flooding, fish stock redistribution, and declines in ecosystem productivity (Barbier, 2017; Österblom et al., 2017). They also face institutional change (Schlüter et al., 2013; Song, Johnsen and Morrison, 2018), including changes in customary management such as sea tenure, closed systems, taboo areas (Curry et al., 2012; Lau, 2020; Whitmore et al., 2016). These changes inevitably involve navigating questions of justice. Institutional change shifts who benefits from, owns, and governs resources, and whose claims and rights are recognized. In the midst of these vast changes, a greater understanding of perceptions of environmental justice within communities will be crucial to support fair adaptation. However, to date, little work has examined how people's perceptions of justice respond to changing socio-ecological systems (Dawson et al.,

2017), instead tending to focus on conservation or management interventions, such as payments for ecosystem services (Sikor, 2013), larger scale injustices (Ikeme, 2003), or justice movements (Patterson et al., 2018).

Understanding what is just or un-just remains a key challenge, because people's moral concerns bound appropriate responses to both fast and slow environmental and social changes. For instance, perceived injustice is at the core of many conservation and development conflicts (Fabinyi et al., 2013; Gurney et al., 2014). In the context of a rapidly changing world, the pursuit of justice matters ethically and pragmatically. From an ethical standpoint, perceptions of justice underpin people's very definition of flourishing or suffering. Variation in these perceptions thus requires different approaches to supporting wellbeing (Narayan, 2000; Sayer, 2011; Lehmann, Martin and Fisher, 2018). Pragmatically, experiences of and concerns about (in)justice can influence how people behave, particularly in group settings like collective resource management (Chambers, 2013; McGregor, Coulthard and

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Camfield, 2015; Tyler, 2015). Concerns about fair outcomes may be an important motivation for collective action, even overriding motives like financial gain (Fehr and Falk, 2002; Falk and Szech, 2013; Tyler, 2015; Martin, 2017). Conversely, resource management or conservation can be undermined by failure to address injustices because people may care more about injustice than about whether or not a resource is sustainably managed (Bennett and Dearden, 2014; Fabinyi et al., 2013; Twina-matsiko, 2014). These ethical and pragmatic concerns have led to calls for greater empirical and theoretical attention to justice in climate change policy (Klinsky et al., 2016), conservation (Friedman et al., 2018), commons and institutional analysis (Agrawal, 2014), social-ecological systems and resilience (Fabinyi, Evans and Foale, 2014), and ecosystem services (Sikor, 2013; Martin et al., 2014; Marshall and Gonzalez-Meler, 2016).

The field of environmental justice offers a theoretical foundation to investigate justice in environmental change and management. Theorists posit three dimensions of environmental justice; distribution, procedure, and recognition (Walker, 2009; McDermott, Mahanty and Schrecken-berg, 2013; Martin, 2017). Distributional justice refers to how costs and benefits (including material or non-material, objective or subjective), opportunities, risks and responsibilities are distributed between groups, including who suffers from environmental harms or costs of management (Walker, 2014). Early environmental justice approaches sought to quantify unequal distribution of hazards (Mohai, Pellow and Timmons Roberts, 2009), while latter work emphasize the plurality of just distribution, including criteria beyond equality, such as merit, need, responsibility (polluter pays), or existing rights (Walker, 2012; Fisher et al., 2018). Procedural justice concerns procedures and processes for governing ecosystems, who is involved, and how these procedures and participation govern distribution. Distributional and procedural justice often support one-another, but not always. For instance, in Tanzania, conservation projects that enhanced local decision-making resulted in more support for forestry management, even without notable material benefits (Gross-Camp, 2017). Finally, recognitional justice encompasses questions about whose views, identities, interests, knowledge and worldviews are legitimized, respected, and valued in interpersonal encounters, public discourse and practice. Recognitional justice requires understanding the status of social groups with specific cultural values, ideas, and identities, but is poorly understood and relatively neglected in conservation (Martin et al., 2016). Lecuyer et al. (2018) argue that justice-as-recognition is inextricable from the other two dimensions because it determines whose values matter in evaluating fair costs and benefits, whose knowledge counts in decision-making, and whose justice norms or notions are considered legitimate in comparison to others. For instance, pursuit of benefit sharing in conservation projects in developing countries (i.e. distributional justice) often requires groups to assimilate dominant discourses related to human-nature relationships, leading to recognitional injustice (Martin, McGuire and Sullivan, 2013).

Environmental justice scholarship uses a range of closely related terms, sometimes interchangeably, to refer to the contents of claims about what makes something just or unjust. These terms include criteria, conceptions, notions, perceptions and principles (for instance, see Sikor, 2013; Martin et al., 2014; Sikor et al., 2014; Lecuyer et al., 2018). Perceptions (and notions) of justice are comprised of dimensions (described above), subjects (who or what justice perceptions apply to) and specific criteria (Sikor, 2013; Sikor et al., 2014). Subjects of justice may include different people across varying spatial and temporal levels, such as groups within communities, current and future generations, and non-human subjects, such as animals or nature itself (Schlosberg, 2013). Criteria of justice, such as equality, define what people believe should happen across the dimensions of justice. For instance, in Korea, fishers felt it was fair that those who worked harder or invested more in the fishery gained more benefits, which is an example of the criteria of merit or proportionality (Song and Chuenpagdee, 2015). In Papua New Guinea and the Philippines, fisherfolk articulated the criteria of equality in concerns about unequal costs and benefits from management accruing

to some fishers (Fabinyi et al., 2013). Justice criteria often overlap with broad justice principles (as an ideal or objective standard of justice that might be universally applied), but may also be comprised of broader moral qualities. Justice and morality are distinct but related concepts, and their relationship is understood differently across disciplines. Some approaches treat justice as one aspect within the moral domain, while in others, morality is one concern that underpins why people care about justice (Skitka et al., 2016). For the purposes of this paper, we understand moral criteria as key aspects that shape broader perceptions of justice. For instance, in Mexico, trust and respect were important criteria of justice in interactions between actors in environmental management (Lecuyer et al., 2018). Perceptions of justice also depend on people's social and cultural context, including their position within specific configurations of power (Walker, 2014). By extension, perceptions of justice are plural (Sen, 2010), and vary across and within communities and issues (Paavola, 2003; Lecuyer et al., 2018). Understanding the culturally and contextually specific criteria that comprise justice perceptions will be critical for crafting, influencing or implementing management and adaptation measures (Curry et al., 2015; Holland, 2017).

However, environmental justice approaches could be strengthening by exploring wider moral and relational aspects of justice embedded in local justice perceptions. Although the context-specific, plural nature of justice perceptions is well recognized, several empirical and analytical gaps remain. Firstly, typical approaches in research on fairness in conservation and environmental management are often based on tacit assumptions about what is fair (typically equality or proportionality based on resource opportunity costs). Pre-defining justice may obscure the criteria that matter to communities as they navigate and adapt to slow and local manifestations of global environmental change. Secondly, empirical studies of local justice perceptions across all three-dimensions in non-Western contexts remain rare (Friedman et al., 2018; Lehmann et al., 2018, although see Lecuyer et al., 2018; Zia, 2011). When they do specifically examine local perceptions of justice, most studies focus on perceptions regarding an outside intervention, for instance market-based conservation measures (Fisher et al., 2018; Martin, 2019; Sikor et al., 2014). We argue that the environmental justice approach is useful beyond cases where specific and obvious injustices arise due to outside influence. It can illuminate key concerns and trade-offs as communities navigate global change.

Finally, studies of and attention to recognitional justice are particularly nascent, in part because it is difficult to identify, and hard to measure (Martin et al., 2016). This gap creates a 'need to explore and develop analytical and practical ways to pursue relational aspects of environmental justice' (Martin et al., 2016: 260). Expanding the scope of what is counted as moral in investigations of perceptions of justice can help address this gap. Morality directly concerns relationships or relationship regulation with others (including non-humans) (Sayer, 2005; Rai and Fiske, 2011). Indeed, morality is likely an important aspect of recognitional justice in the context of slow institutional change; the legitimacy of institutions (or behaviours) is directly linked to the moral values and discourse that actors use to justify what is or should be (Hall, Hirsch, & Li, 2011). As such, certain patterns of morality may underpin the legitimacy of institutions, and vice versa, change as an institution's legitimacy changes (Abend, 2012).

Recent progress in moral psychology and sociology offer an analytical basis to examine relational aspects of justice perceptions by expanding the scope of what counts as moral criteria. Moral psychology emphasizes that moral intuitions, judgements, and reasoning are culturally specific; people may place greater emphasis on moral principles like care, loyalty, authority and sanctity, sometimes over those of harm or fairness (Graham et al., 2013; Haidt, 2013). Thus, in certain places, collective morals, and thus principles of respect and obedience may override concerns about individual freedoms that comprise moral intuitions elsewhere, including Westernized, industrialized nations where the field of environmental justice emerged (Mohai, Pellow and Timmons Roberts, 2009). Work in sociology emphasizes that studies

concerning morality must attend to both ‘thick’ and ‘thin’ moral principles. Thin principles, such as ‘rightness, wrongness, permissibility, impermissibility’ (Abend, 2012: 145) can be universally applied to any object or action. On the other hand, thick principles, such as generosity and dignity, depend on institutional and cultural presuppositions. They simultaneously describe and evaluate, and thus hold embedded values about what kind of person (or community) one should be (Abend, 2011, 2012; Hitlin and Vaisey, 2013). For example, to call a situation as oppressive, simultaneously describes and makes a negative moral evaluation of it (Abend, 2012; Sayer, 2017). Thick moral principles can thus provide a deeper, context specific understanding of relational values within environmental justice.

We contribute to understandings of environmental justice by examining perceptions of justice within communities, building on progress in moral psychology to expand the definition of what counts as criteria in perceptions of justice. Specifically, we explore people’s perceptions and articulations of justice issues and criteria in two contrasting case studies in Papua New Guinea. Both are in the midst of slow social and environmental change, and have customary management institutions but with different levels of legitimacy (Section 2). We ask specifically, what perceptions of justice do people articulate around the use and governance of coral reef resources across the dimensions of distribution, procedure, and recognition?

2. Background and study sites

We examine perceptions of justice in two case studies in Papua New Guinea; Ahus Island and Karkar Island. Ahus Island, Manus Province (Fig. 1, Table 1), is a low-lying atoll, highly dependent on fishing, and highly vulnerable to sea-level rise and climate change impacts (Maina et al., 2016). Muluk and Wadau (Fig. 1, Table 1) are adjacent communities on the coastline of Karkar Island, Madang province, predominantly pursuing subsistence and cash crops livelihoods. Each case is experiencing different livelihood pressures and social changes in the context of globalization. Ahus island is more connected (with a guest house and mobile phone coverage), wealthier (primarily through remittances from residents who have migrated to larger cities), and closer to the provincial capital (Lorengau), which means that young people are more influenced by changing values and aspirations. Although less so than Ahus, Karkar is global connected through high dependence on cash crops (copra and cacao) that are priced on international markets, patchy mobile phone coverage, a ring road that circumnavigates the island and connects villages to island transport hubs, and increasing prevalence of motorized boats.

In addition, the communities in both case studies hold sea-tenure over and customarily manage their reefs, but with very different levels

Table 1

Summary of ecological, demographic, and socio-economic characteristics (adapted from Lau et al., 2019). Notes. *Common species based on biomass. **Pelagic species in Karkar based on Havige and Reed (2012), and in Ahus based on unpublished catch data.

	Karkar	Ahus
Demographics		
Population	1068	703
Households	198	143
Distance to nearest provincial market	68 km	24 km
Local	Volcanic island	Coral atoll
Geomorphology		
Marine ecosystems		
Reef lagoon	Limited	Extensive
Reef flat	Extensive	Extensive
Slope	Steep	Gradual
Common reef-associated fish species*	<i>Lutjanus gibbus</i> , <i>Naso caesius</i> , <i>Naso hexacanthus</i> , <i>Pterocaesio tile</i> , <i>Acanthurus lineatus</i> , <i>Macolor macularis</i> , <i>Chlorurus japanensis</i>	<i>Lutjanus bohar</i> , <i>Lutjanus fulviflamma</i> , <i>Acanthurus olivaceus</i> , <i>Chlorurus bleekeri</i> , <i>Acanthurus auranticavis</i> , <i>Acanthurus grammoptilus</i> , <i>Parupeneus multifasciatus</i> , <i>Siganus vulpinus</i>
Pelagic (deep water) fishing grounds	Extensive	Extensive
Common pelagic fish species**	<i>Katsuwonus pelamis</i> , <i>Thunnus albacares</i> , <i>Thunnus obesus</i>	<i>Eythynnus affinis</i> , <i>Thunnus obesus</i> , <i>Elagatis bipinnulata</i>
Dependence on marine resources	Low	High
Institutional context		
Access to basic services	No running water in Muluk, no sanitation, some solar lights, some generators, health clinic	Tank water, limited sanitation, solar lights in most households, some generators, health clinic
Local governance	Combination of clan leadership and elected government officials	Combination of clan leadership and elected government officials
Legitimacy of local clan leadership	Strong	Declining
Customary marine management	Communities hold sea-tenure over reefs	Community holds sea-tenure over reef
Formal fishing regulations	None, except national moratorium on sea cucumbers	None, except national moratorium on sea cucumbers
Informal fishing regulations	Rotating reef closures, clan owned areas with access restrictions, gear restrictions	Clan owned areas with access, gear, time restrictions
Compliance	Strong	Weak

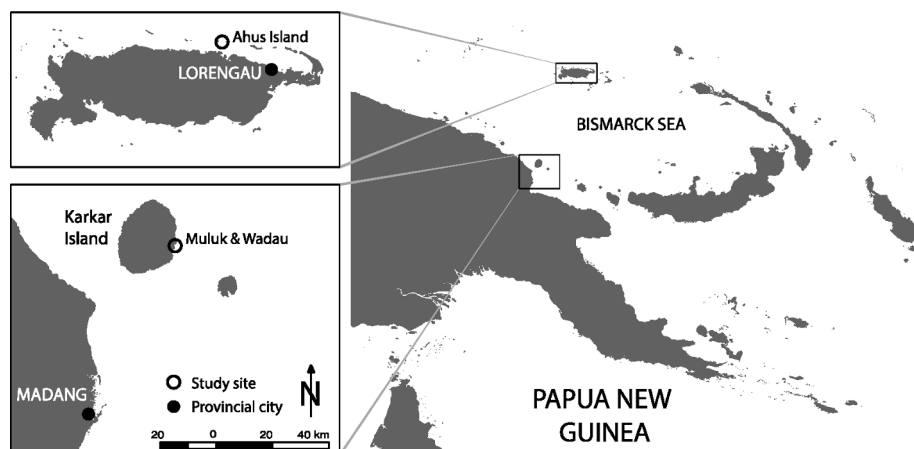


Fig. 1. Location of study sites in Papua New Guinea.

of legitimacy. In Papua New Guinea, customary management of terrestrial, coastal and marine resources is changing and being re-imagined in the midst of social, economic and ecological changes wrought by globalization (Patterson and Macintyre, 2014). As technologies, aspirations, connections to markets, and ecological health changes, certain aspects of customary institutions may remain strong, while other aspects lose legitimacy (Lau, 2020). Legitimacy depends on how actors and institutions justify what is or what should be, through moral values and discourses (Hall, Hirsch and Li, 2011). Shifts in legitimacy are thus directly tied to morals. This strong connection between moral principles and institutions may form socio-cultural limits to adaptation. For example, in East New Britain traditional cocoa farming practices became untenable after a pest outbreak diminished yield. However, rather than adapting, many smallholders left cocoa farming rather than shifting to modern, high-input farming, which ‘require[d] abandoning a ‘way of life’ that provides status, identity and a moral order’ (Curry et al., 2015:1). In both our case studies, neither coral reefs nor pelagic fisheries are formally regulated, except for sea cucumbers, which were under a country-wide moratorium at the time of fieldwork. Likewise, neither case study has a co-management agreement with the National Fisheries Authority (NFA), although Ahus island has benefitted from NFA provided Fish Aggregating Devices. Thus, in both cases customary rules (described below) remain the main form of management.

In Ahus, each of the four main clans, sub-clans and individuals within clans hold consanguine customary rights to make rules about and give permission for other to fish areas of reef under their remit, use of certain fishing gears, at different times of day (see Lau, 2020 for detailed description of customary rules in Ahus). Other parts of the reef, and the open ocean beyond, are open access. In Ahus, customary management has changed over time and many (but not all) of these rules have diminished in legitimacy. For example, bans on spear-fishing at night are not adhered to, but women still abide by the custom of seeking permission to fish in another clan’s area. As in Ahus, in Muluk and Wadau specific clans’ own sections of the reef, and have the rights to exclude outsiders, and declare fishing rules. Both communities, but Muluk in particular, uphold a system of adaptive customary management of their reefs, which involves the rotational closure of almost the whole reef to all activities, for extended periods of time (see Cinner et al., 2019 for detailed description of customary management in Karkar). Specifically, if clan leaders perceive that fish are becoming harder to catch, they will close the reef to all fishing (including line fishing, trolling and spear-fishing), and re-open when there are changes in fish numbers and behaviour, through discussions with the broader community. In Karkar, the legitimacy of customary rules and compliance is very high (Cinner et al., 2019).

3. Methods

We took an exploratory case study approach, using qualitative mixed-methods, including short key informant interviews, semi-structured interviews, participant and direct observation, and informal conversations (Flyvbjerg, 2006; Bernard, 2017). During initial community visits, the first author undertook 4–5 key informant interviews with local community leaders to build understanding of the customary reef governance system, and to identify key benefits derived from the reef

Table 2
Interview details at Karkar Island (combining the communities of Muluk and Wadau) and Ahus.

Interviews	Karkar	Ahus	Total
Older Women	5	5	10
Younger Women	5	5	10
Older Men	5	6	11
Younger Men	4	5	9
Total interviewees	19	21	40

and related justice issues. On return visits over one year (total three months), the first author used a purposive sampling approach to select diverse interviewees from each clan, and conducted 40 semi-structured interviews in Papua New Guinean Tok Pisin (Table 2). Interviews were conducted at respondent’s houses in an outdoor area, away from on-lookers, at a pre-arranged time. Interviews took between from 30 min to 1 h and 30 min to complete, and were audio recorded.

Interviews were semi-structured and designed to elicit both descriptions and evaluations about use and governance of marine resources, specifically regarding fish (reef and pelagic), invertebrates, the use of and access to fishing space, the customary governance of reefs including participation, and the nature of decision-making, across the three dimensions of justice (Table 3). The first author asked interviewees to elaborate on specific issues and examples of justice and injustice, asking why or why not they believed different distributions or procedures were fair or unfair, and what would be a desirable alternative.

To ensure questions were locally relevant, we drew on observations and informal interviews to ask about specific justice issues and practices relevant to each site. In Ahus, we included specific questions about a Fish Aggregating Device (FAD) installed by the National Fisheries Authority, and how benefits and access were distributed. In Muluk, we included specific questions about the customary reef closure and procedures for re-opening the reef, including clan meetings and by-laws. Interviews were transcribed into English by a native speaker of Papua New Guinean Tok Pisin and checked by the first author for accuracy.

The first author also observed, participated in and took comprehensive fieldnotes at: four community meetings; two clan meetings (both in Karkar island); ten visits to local markets; four fishing and gleaning trips to the reef with women; and the opening ceremony of Muluk’s closed reef fishing area. Community meetings were held weekly to discuss issues and events in the community, including issues and concerns about the management of the reef, and information about the reef opening ceremony. The two clan meetings were held to discuss the by-laws to institute when the reef was opened in Muluk. In Ahus, information was usually communicated by the Church leader and ward development officer after the Sunday church service, or prior to the opening of the weekly market. In each community, the first author was

Table 3
Example questions about issues of distributional, procedural and recognition justice. Note that questions about recognition overlap with questions about distribution and procedure.

Interview questions	Distribution	Procedure	Recognition
Descriptive	Do some people benefit more from fisheries here? E.g. do some people make more money from the reef? Why? What are the by-laws and who do they apply to? Who bears more of the costs of this rule in terms of accessing reef resources?	How are decisions made about the reef resources here? Who is involved? How are decisions reached?	Do you think everyone’s opinions are listened to? Please explain a time when there’s been a conflict within the community over natural resources. What was the conflict about? What did the different groups think about the conflict? What did they do? Was it resolved? How?
Evaluative	Is it fair that some people gain more benefits from the reef? Why or why not? Is it fair that some people (e.g. women) cannot access certain parts of the reef? Why? Why not?	In your opinion, what is the fairest way to make decisions about the reef? Who should be involved? What is the best process for making decisions?	Is it fair that some people have less say? Do you think the conflict about ×, was solved fairly? Why or why not?

hosted by families from each clan (for between 5 and 14 days), enabling her to build rapport and engage in informal conversations about general aspects of life in the community. These informal conversations and observations both guided the development of interview questions, and were used to triangulate the results from the semi-structured interviews.

The first author analysed interviews iteratively in NVIVO, using a combination of thematic and open coding (Flick, Metzler and Scott, 2013). Initially, she coded a random selection of interviews to identify recurring themes, including commonly occurring justice concerns (e.g. poaching), justice criteria (e.g. need, equality), practices mentioned (e.g. spear fishing at night), and moral principles (e.g. respectful, selfish). She also coded for descriptions of change (demographic and environmental) that people used to identify, explain or justify their justice criteria. In the second round of coding (all interviews), the first author retained and refined these initial codes and coded thematically around the three justice dimensions (distribution, procedure, and recognition), who articulated them and to whom they applied (subject) including different groups within the community (related, for example, to gender, age) and also future generations and non-human actors, such as fish (Sikor and Newell, 2014). One co-author cross-checked a random subset of coded quotes.

4. Results

We found similarities and differences in the perceptions and criteria raised across justice dimensions in each case study (Table 4), which we present thematically by case study.

4.1. Ahus island

In Ahus, justice dimensions are entwined and often mutually reinforcing. People held justice concerns about the unequal costs of specific fishing practices, people’s material needs, and lack of participation in decision-making combined with fading respect for customary management.

4.1.1. Distributional justice

Respondents identified unequal costs, rather than unequal benefits, as a core issue of distributional justice. Notably, people did not raise unequal access to certain fishing grounds, or unequal income from the reef as unjust. The few fishers who had outboard motors and could fish for pelagic species made more money than those with only canoes. However, this inequality was explained as a matter of luck, and sometimes God’s will, rather than a form of injustice. In contrast, many emphasized that relentless fishing effort and intensity (fishing constantly day and night), and using more efficient fishing methods, had unequal and therefore unfair costs to future generations, others in the community, and non-humans (fish). Respondents emphasized that benefits from the reef should be earned through appropriate hard work (merit). Both a specific form of women’s collective fishing and night spearfishing (whereby fishers use waterproof torches to spear-fish at night, and catch more and larger fish) were viewed as the ‘wrong’ kind of fishing because they gave unfair advantage over other methods, and could be destructive. Collective fishing refers to when a group of women (usually around ten), gathers in the reef lagoon and creates a disturbance, splashing and yelling, to herd fish into a small area where they are easy to spear. This method is called ‘fighting the sea’ or ‘paitim solwara’ in Tok Pisin and differs from groups of women line fishing, gleaning and diving together. Women’s collective fishing was viewed as too easy and too destructive to the reef ecosystem and many women had stopped fishing cooperatively after being stopped on several occasions by men. Notably, the women did not articulate being prevented from using this method as unfair.

People likewise considered spear-fishing at night too easy and disruptive, and thus unfair. One woman emphasized that:

“Our husbands *shouldn’t* go diving at night time because... the fish

Table 4

Summary of justice issues identified in Ahus and Karkar across distributional, procedural, and recognition justice dimensions with description of issues, criteria, concerns, and subjects.

Justice issue	Criteria	Concerns	Subjects
Distributional justice in Ahus			
Night spear-fishing creates unfair costs and benefits and breaks customary rules	Equality	Unequal costs and benefits	Community; future generations;
	Merit	Reef resources should be gained through appropriate hard work	Non-human agents (fish); young men; fishers using specific gear/ methods
	Need	Unfair to ban because of need	
Intensity of fishing effort	Equality	Unequal effort	
		Unequal costs and benefits	
Women’s cooperative fishing creates an unfair advantage and damages reef	Equality	Unequal costs	Women; fishers using specific gear/ methods
	Merit	Not considered unfair to ban	
		Reef resources should be gained through appropriate hard work	
Unfair placement of fish aggregating device (FAD)	Equality	Equality of opportunity	Fishers from different clans and locations
Distributional Justice in Karkar			
Night spear-fishing creating unfair costs and benefits	Equality	Unequal costs	
Damaging fishing practices (e.g. poisonous derris root)		Unequal benefits	
		Fair to ban	
Fishers using specific gear/ methods	Equality	Ensure equal benefits go to those less able	Clan ‘A’ members, older women
Monetary benefits from bêche de mer (sea cucumbers) and trochus shells	Need		
Benefits and harms entwined with right conduct and luck	See recognition		Men and women, families, Non-human agents (nature)
Procedural Justice in Ahus			
Community and clan-based decision making considered ideal but not realized in practice	Equality	Equality of opportunity to participate	Community members; Leaders
Low participation in meetings due to perceived lack of follow through	Equality	Inequality in participation	Young men; leaders
		Responsibility for decision-making and follow through on decisions	
		Responsibility for decision-making and follow through on decisions	
Procedural Justice in Karkar			
Regular deliberative decision-making at clan and community level with high participation	Deliberative decision-making	Equality of opportunity to participate and voice concerns in decision-making and debate	Clan members; community members
Deliberative decision-making		Constructive conflict	
Recognition Justice in Ahus			
Loss of respect towards clan leadership and customary law	Respect	Declining respect	Young men; Clan leaders; Community

(continued on next page)

Table 4 (continued)

Justice issue	Criteria	Concerns	Subjects
Community members should all have a say in decisions		Equality of opportunity to be heard	
Recognitional Justice in Karkar			
Worldview that moral conduct creates benefits and harms	Obedience	Proper adherence to customary laws and norms	Community
	Respect	Respect for leaders' knowledge and decisions	
Emphasis placed on continual recognition of customary practices and clan leadership	Respect	Respect for leaders' knowledge and decisions	Community; fishers; family

are sleeping and it's easy for them to get fish of all sizes and disturb them from breeding. During the day, the fish are awake and alert.” (Woman, age 42, Ahus, author’s italics)

The justice concern articulated in this quote includes non-human actors (fish) as subjects of justice. Respondents talked about the need for fish to rest, about fish having a fairer chance of escape if they are awake and alert, partially for the sake of the fish themselves, but also for the sustainability of the fishery. For instance, in the above quote, spear-fishing at night is perceived to disrupt fish breeding. Respondents emphasized that the ease afforded by working together or night spear-fishing gave fishers an unfair advantage over fish, and others in the community.

However, the wider community has not stopped men’s relentless fishing and spear-fishing at night. Instead, justice concerns about unequal costs of these practices were tempered with justice concerns about fisher’s material needs. People across the community, across all ages and genders described how men needed to spear-fish at night or fish day and night, constantly, to fulfil their material needs and feed and support their families. For instance, one young man explained that he did not “mean to cause damage to the ocean but if I go today and tomorrow, I will go back again because I have to live and survive” (Man, age 21, Ahus). Thus, although many clan leaders banned night spear-fishing in their tenured reef areas, they were hesitant to rebuke the younger men who disregard the rules. For instance, one leader no longer reprimanded people for diving in his area of the reef. “I’ll hear about people diving in my area but I won’t really say much, I won’t argue because... if I stop that person then that person will be hungry or have no food. So I leave it” (Man, age 41, Ahus). Many leaders with rights to ban access and specific activities in their reef areas were reluctant to prevent people fulfilling their material needs. Family and kinship ties between older clan chiefs and young men further complicates the equation of non-compliance, given that the young men breaking the rules share kinship with leaders as for example, nephews, sons, sons-in-law, or grandsons.

4.1.2. Procedural justice

In Ahus, people’s perceptions of procedural justice were not realized in practice. Respondents emphasized that a combination of community or clan-level participatory decision-making—in the form of regular meetings, where people could share ideas—was a fair way to govern the reef. One man explained, that leaders “have to get ideas and thoughts from the community as a whole... if everyone puts in their ideas, and out of criticism, there might be good ideas that come out of it” (Man, age 21, Ahus). Some wished to return to stronger rights and deliberation at a clan level. One man explained that “the leaders will talk but it’s up to each clan to put restrictions” (Man, age 26, Ahus). However, this ideal version of fair decision-making procedures was not active at either community or clan level. Clan chiefs no longer held power to call community-wide meetings, and there had been none in the five years

prior to fieldwork. When meetings did occur, young men did not participate. One young man stated that “most times the youths won’t participate [in meetings] and most of the time they don’t know that people are gathering like that, and things are not going well because of that” (Man, age 26 Ahus). Young women also (but women more broadly) rarely actively participated in decisions about the sea, and were not confident to raise issues at rare meetings that do occur. One respondent explained that “some women who have the courage to speak up will go argue or help with decision-making. Women are not strong enough to face hard decisions, so the one or two that have the courage to do so will go ahead and do so” (Woman, age 24, Ahus). This fragmented participation in decision-making was closely linked to declining respect and the legitimacy of both leaders and decision-making processes in Ahus.

4.1.3. Recognitional justice

When discussing issues of both distributional and procedural justice, respondents often raised lack of respect and obedience as a growing challenge. In interviews, respondents linked this fading respect for customary management to changing environmental and social conditions in the community, including population growth, climate, and environmental change. Several respondents linked declining respect directly to need for income and subsistence, and increasing pressure on resources. One woman emphasized how people “listen sometimes and sometimes they do not respect it...they just stop listening. What can we say? It is hard. The way people look for fish here it is too much, as families are getting bigger” (Woman, age 62, Ahus). Young men, in particular, emphasized that environmental and climate change, and degradation created the need for intense fishing effort, including night spearfishing, in turn, changing reciprocity in the community. The Nature Conservancy is actively engaged with the community on Ahus island, including through climate change awareness campaigns, which may have shaped the inclusion of climate change concerns in local perceptions of justice. One young man explained:

“When the ocean was damaged [by a king tide in 2009], the attitude of sharing stopped. People were thinking about themselves; ‘If I give it to someone, I won’t have anything for myself.’ The people here on the island, our source of income and food is dependent on the ocean... If the ocean is spoilt and I don’t have any rice, I won’t give anything to anyone. I think that climate change has affected the way in which people share” (Man, age 24, Ahus).

However, respondents also viewed the shift in respect and attitude as part of generational changes in aspirations and power. Many people were concerned with younger generations’ declining respect towards customary ways of managing the reef, and expressed frustration at the ‘big-headed’ (disrespectful or disobedient) behaviour of young men. Clan leaders expressed frustration at fading respect and changes in attitudes, and their resulting inability to enforce customary rules. Punishments, such as taking people to court, no longer worked to deter people. One young man explained how, for some, non-compliance and disrespect were acts of asserting one’s individuality and strength.

“...bullying, some of the young men do it. If the leaders of the village restrict an area and I wanted to go diving at night time, I won’t hide. Everyone will see me and I’ll go diving. If you tried to come talk to me, I might try and shoot you with my fishing gun... that’s how I see the men doing things... I just want to show you that I’m strong, I only listen to myself. When the elders talk, I won’t listen to them... I will just do what I want” (Man, age 24, Ahus).

This quote captures intergenerational tensions in recognizing traditional forms authority, and thus how changing aspirations and power can shift the legitimacy of customary systems. Taken together, recognition of people’s needs combined with intergenerational tension highlights the plurality of justice perceptions. In Ahus, breaking the (albeit fading) rules is seen concurrently as an act of need caused by environmental change and poverty, and an act of rebellion.

4.2. Perceptions of justice in Karkar

In Karkar, as in Ahus, the three dimensions of justice are tightly interdependent, and inextricable from a worldview that understands adherence to and respect customary law as a precursor to good fortune and luck at sea. Local decision-making procedures create a regular space and practice for deliberation of issues of distributional justice and hold greater legitimacy than in Ahus. In turn, this legitimacy is inseparable from an attitude of respect for custom.

4.2.1. Recognitional and distributive justice

In Karkar, perceptions of distributional justice are strongly tied to the legitimacy of and adherence to customary law. Customary law is described in terms of laws of nature, and breaking the rules brings bad luck. Many respondents explained how adherence to the proper code of conduct set out in customary law determined whether a fisher, or family would have luck or good fortune or conversely harms or bad luck. One man explained how: “Great fishermen still abide and follow those customs. When they want to go to sea, they won’t eat certain fruits, but if they do touch it or eat it, they will find trouble out at sea” (Man, age 43, Karkar). These custom laws included taboos around certain behaviours prior to a fishing trip and while fishing for both fisher and family, rules around social relations and when to fish, and norms of generosity and community-mindedness (Table 5).

Thus, for many in Muluk and Wadau, nature held a form of moral agency through the laws of custom. This connection places the responsibility for the distribution of costs and benefits from the reef with households and families, and unequal benefits and harms are not perceived to be an issue of injustice but rather improper adherence to custom.

This worldview situates nature as a subject of recognitional justice with agency that must be respected. Some equated respect for nature with respect for others in society. For instance, one man emphasized:

“All the resources are for me to look after and eat from, and I must not do anything that is bad. If I turn the reef [upend corals] then I am damaging it, *I am not respecting it and if I do that then I am not going to respect other people.* I must respect everything” (Man, age 55, Karkar, author’s italics).

Upholding respect for custom is important in Muluk, extends to respect for leaders, and is instilled from the community down to a family level. This legitimacy is supported by a humble attitude, described by many respondents. One man emphasized that; “Muluk people are humble and they are under [the leadership of] their clan leaders and community leaders, government leaders and church leaders” (Man, age 46, Karkar). For instance, respondents described young people as respectful, compared to other communities on Karkar island; “The young people here in Muluk are good compared to the ones in other communities. Now that you are here, you will see the young ones, even though they are drinking or they are doing other things, they will still respect the leaders” (Woman, age 31, Karkar).

Respondents emphasized that respect for leadership also underpins the successful customary reef closures and the regulation of damaging behaviour. An advisor to clan leaders, known for his expertise on judging the health of the reef explained: “When I say that the ocean is damaged, and we need to stop then they will listen, *they respect me, and I respect them...* we agree on it and ban going to the ocean until a month when things are good.” (Man, clan advisor on reef condition, age 55, author’s italics). Regulating destructive fishing practices was seen as part of respecting customs. As in Ahus, people in Karkar held concerns about the distribution of costs from sustained and destructive fishing practices, including the use of derris root to stun fish, and the harvesting of Acropora corals to make lime (a powder that is chewed with betel nut). As in Ahus, people in Karkar did not perceive differences in people benefitting unequally from the ocean as unfair, but rather as luck or a choice. However, in Karkar, respondents considered it fair to uphold bans to these practices, as well as night spear-fishing and the use of nets,

Table 5

Examples of customary laws pertaining to fishing in Muluk and Wadau. *Bombom is a traditional fishing method, that uses a light (traditionally a burning palm frond) to attract and spear fish at night. Clan leaders confer rights to fish using the Bombom style through an initiation ceremony, to selected young men who have proven themselves both respectful and strong fishermen.

Broad theme	Custom	Quote
Fisher’s food consumption and behaviour	Ban on eating certain foods (e.g. Okari nuts or Pandanus tree fruit) before going to fish using certain methods	“For example, if I want to go down to the sea at night to bombom fish*, I must not eat talis (Okari) nuts or marita (fruit of the Pandanus tree). If I do eat then and go to sea, I will find trouble. The long mouth fish will attack me or I could get killed” (Man, age 43, Karkar).
Household conduct	Ban on noisy activities (e.g. sweeping around the house, children running around and making noise) while a fisher is at sea	“When the man goes fishing then no one should come and make noise at the house but they must be quiet and/or sleep. [If they make noise] the man will see the signs in the ocean and that is what I see” (Woman, age 40, Karkar).
Women’s bodies	Ban on fishing when a fisherman’s wife is pregnant or menstruating.	“When [sardines] are in season, if a woman is pregnant then that woman’s husband must not go down to the ocean. If he goes then those fish will go somewhere else. Those are the types of customs that are still here today” (Man, age 42, Karkar). “Even when a woman has already had given birth and the baby is new, we can’t go to the ocean. These are the laws that our ancestors have made and followed so we do the same. These are not lies, if we don’t follow and go down [to the ocean] then bad things will happen to us” (Man, age 27, Karkar). “When a woman has her period than her husband won’t go down to the ocean, even fishing at night time is not allowed. If that happened to me than I must tell my husband and he won’t go down to the ocean... [if I don’t tell him then] he will go out fishing and fish will hurt him or something” (Woman, age 46).
Social relations	Bad luck will come if a fisher goes fishing before resolving a conflict with his household or wider family.	“What I see, when the man wants to go fishing and his wife complains, then he will either have something bad happen to him or he won’t catch anything at all” (Woman, age 46, Karkar).

but also to ban the use of the reef entirely for certain periods (up to two years), even though this stops women and children fishing because they are not permitted to go out beyond the reef.

4.2.2. Procedural justice

Respect for custom, community and leadership within and across the community, allow Muluk and Wadau to constantly refine the

distribution of costs and benefits from their reef through active deliberative decision-making. Muluk and Wadau both have active, deliberative decision-making processes in place for discussing community issues, including concerns about distribution of costs and benefits from coastal access and resources. Each community holds a weekly meeting to discuss community issues. Clans also hold clan-only meetings. For instance, during fieldwork each of the three clans in Muluk held a number of meetings to organize the opening of the reef (after a closure for approximately a year), and agree on the by-laws to be put in place once the reef was opened.

These meetings facilitated proactive and reactive governance of the coastal resources. One man explained how at meetings “everyone gives their input or ideas and when they make decisions it is based on what has gone wrong or what is damaged... they talk about how to bring it back or improve it, when something is damaged” (Man, age 27, Karkar). For example, one clan decided that when moratorium on sea cucumbers was lifted, clan income from sea cucumbers should be shared equally between households, because “some of the older women would find it hard to collect them” (Woman, age 40, Karkar). Community and clan meetings also provide a forum where issues and concerns about non-compliance to clan boundaries can be raised, which in turn re-draws, re-defines, and strengthens recognition and thus legitimacy of such boundaries. For instance, in one meeting, a woman from one clan raised that she had witnessed a woman from a different clan (whom she did not identify) fishing in her clan’s reef area, leading to a discussion, in which the community collectively re-iterated the rules around clan boundaries to mutual agreement across all clans.

These deliberative decision-making practices provide an important forum for constructive conflict. One young woman explained:

“We argue over the land and the ocean... When we argue about *it is a good thing* because it means that we care. And *we must argue and dispute over it* so it will be in a good way. The next generation will live of these things so when we argue it means that we want it to be in a good way. If the elders don’t dispute and talk about it, then I will destroy it and there will be nothing in the future for the kids because I have destroyed it. Fighting and arguing maintains a balance in life. We must look after the land and plant food and earn from it, so it is ok to fight about it. It’s the same with the ocean, *we must argue over the fish so there will be fish*. But if we do not do any of that than there will be nothing” (Woman, age 21, Karkar, author’s italics).

In this quote, arguing and conflict is seen as part of the process of stewardship and care for future generations (subjects of justice). Leaders are positioned as responsible for these disputes, and conflict (‘fighting and arguing’) is viewed as constructive. As in Ahus, women rarely contributed to debates about men’s fishing or behaviour. Although some, usually older, slightly more educated women were vocal in meetings, the issues they raised usually only pertained to women’s fishing and women’s benefits. Lack of access created by the customary bans on the reef were not articulated as unfair, because of the greater good they give the community. One woman explained how: “the women are not allowed to pick up corals to bring back up here to make lime, they have stopped all that” (Woman, age 40, Karkar). In general, women tended to sit at the edge of groups during meetings, and were responsible preparing and delivering coffee and food for participants, and thus unable to participate in all discussions.

5. Discussion

Our research has three key findings that contribute to advancing the literature on environmental justice. Firstly, in developing coastal communities, material need may be a crucial justice concern that overrides other justice concerns, such as compliance. Secondly, practicing deliberative decision-making that supports constructive conflict can help communities navigate questions of fair distribution as they arise, but likely requires the legitimacy conferred by respect and recognition. Finally, at a local scale, recognitional justice concerns are connected to

procedural and distributional justice, and articulated as concerns about respect. We discuss each of these findings in turn, before examining the benefits and limitations of applying an environmental justice lens at a community level.

5.1. Need

Justice concerns about need may be especially important when managing coastal resources in times of change. Need may constitute a ‘taboo-tradeoff’ (Daw et al., 2015; Tetlock, Mellers and Scoblic, 2017), whereby people are unwilling to jeopardise other’s needs for other criteria of justice. In both our case studies, respondents perceived damage to the reef caused by destructive gear use (torches and nets respectively) and intensive fishing effort as having unequal costs to the community, future generations, and non-humans (fish), which they perceived as unfair. However, in Ahus, concern about unequal costs was tempered by recognition that the use of intensive fishing methods was necessary for survival. Clan leaders—who would traditionally enforce the rules and punish non-compliers—recognized the needs of non-compliers, and were unwilling to force them to comply. Similarly, fishers and community members in places as diverse as Lake Victoria, Tanzania, Galicia, Spain, and the Nemunas Delta in Lithuania, accept and justify illegal fishing and non-compliance because of need (Hampshire et al., 2004; Cepić and Nunan, 2017; Ballesteros and Rodríguez-rodríguez, 2018). Trade-offs between the more immediate needs of vulnerable community members and the longer term sustainability of resources are likely to be taboo (Daw et al., 2015). Thus, while unequal distribution of costs are common concerns in coastal fishing communities (Fabinyi et al., 2013; Bavinck, Jentoft and Scholtens, 2018), in many contexts, need may be at the heart of people’s perceptions of whether these distributions are fair or at least acceptable. Our results, taken with other findings on the moral dimensions of non-compliance (Bergseth and Roscher, 2018), suggest that soliciting locally relevant measures of and concerns about need may help identify limitations to enforcement, and thus inform better design of approaches for managing sustainably.

The ‘taboo-trade-off’ between long term sustainability and the immediate needs of community members support the argument that resources should be governed within ‘safe and just boundaries’ that reconcile basic needs and poverty alleviation (Chaigneau et al., 2018) within ecologically sustainable limits (Dearing et al., 2014). Global climate change will multiply vulnerable people’s unaddressed needs (Pelling and Garschagen, 2019), and may influence and constrain adaptation strategies in communities (Fischer, 2018). Our findings support the idea that links between environmental degradation and poverty are complex and non-linear (Angelsen, 1997). Ahus island is materially wealthier (in income and material style of life) than the communities on Karkar island, and yet is more dependent on reef resources. In addition, Ahus has experienced a social shift whereby young people are returning to the island after school, rather than taking up jobs in larger cities (in part due to lack of opportunity), which was a more common path in the 1980s and 1990s. Thus, dependence on resources and poverty may narrow people’s ability to practice stewardship, despite holding justice concerns about future generations. Importantly, in our cases people held justice concerns about future and current generations, but only in Karkar did leaders hold the legitimacy to enforce rules to manage resources for a longer time horizon. Thus, concerns about basic needs may interact with other justice dimensions, such as the legitimacy of decision-making procedures. Thus, our findings support calls for discourses on ‘safe and just operating spaces’ to expand and deepen their approach to justice, beyond basic material needs alone, to encompass plural local perceptions of justice couched in environmental justice literature (Pasgaard and Dawson, 2019).

5.2. Plural justice and deliberation

In Ahus and Karkar deliberative processes were considered important for procedural justice. Participatory, deliberative decision-making was seen as the fairest way to make decisions about coastal resources. Deliberation supports all dimensions of justice. It provides spaces and processes for defining fair distributions of costs and benefits and a platform for transgressions to be recognised and resolved, and thus a means to foster recognition. For example, in Karkar, the quote; ‘we need to yell about our reef... otherwise I will destroy it’, positions deliberative practices are necessary to stop individual’s pursuing their own self-interest at the expense of others in the community and future generations. Constructive conflict, while often perceived as negative in conservation and other environment-related literatures, is recognized as an important ingredient for democratic governance (Matulis and Moyer, 2016). As plural and contested (Sen, 2010), justice requires public reasoning through deliberation to work towards its (imperfect) realization in a given situation. Joint reasoning can likewise support the development shared normative truths in communities or societies (Habermas, 1984). For example, people are more likely to change their initial moral judgement about a situation they are presented with and have time to reflect on a strong argument (Paxton, Ungar and Greene, 2012), and if they are exposed to differing moral judgements within their own social group, especially from people they admire (Haidt, 2012). Face-to-face gatherings where moral judgements are voiced may also help avoid the situation where people systematically underestimate the types of values they believe that other people favour, for example overestimating the extent that other people rate hedonism higher than altruism (Bouman and Steg, 2019). In Karkar, regular meetings provide a process for joint reasoning about what is fair or unfair, and a reiteration of shared perceptions of justice at a clan- and community-scale.

Holding the political capability to control and govern one’s environment may play an crucial role in addressing human vulnerability in the face of climate and environmental change, and may help move towards more transformational outcomes (Holland, 2017). However, for deliberation to contribute to procedural justice, it likely needs to be fostered as a regular, habitual practice. Repeated deliberation may be key to its success because deliberation is a learnable skill (Martin and Rutagarama, 2012). In Karkar, deliberative decision-making was a regular community practice and habit, but in Ahus, community meetings were rare. These findings around the capability of communities to pursue their ideal processes of procedural justice, may be better illuminated through a capabilities approach to justice (Nussbaum, 2003; Schlosberg, Collins and Niemeyer, 2017; Day, 2018). The capabilities approach examines whether people and communities have the material and social arrangements that allow them to engage in valued functionalities (Day, 2018), which may include living in line with their perceptions of justice across interconnected dimensions. For instance, changing legitimacy in Ahus has undermined the capacity to customarily govern, still valued by many, but this is not illuminated by solely asking about the ideal perceptions of justice.

5.3. Respect and recognition

Concerns about respect for leadership, between generations, and of customary practices are important issues of recognitional justice within communities experiencing socio-economic change and shifts between new and customary forms of governance. In our case studies, respect and obedience were both crucial in enabling or preventing customary institutions to function legitimately. These findings echo Sen’s (2010) argument that there is little to be gained with designing principles for just institutions, assuming that everyone will comply with the rules, or in other words, that an ideally just institution will automatically have legitimacy. For Sen, ‘justice is ultimately connected with the way people’s lives go, not merely with the nature of institutions surrounding them’ (2010:14). A lack of an arena to articulate these justice concerns

may exacerbate issues of respect between younger and older generations in Ahus, thus frustrating recognitional justice.

We contend that attention to moral principles, like respect or disrespect, can capture the recognitional justice issues at the heart of shifts in relational values (Chan et al., 2016), particularly because morality, at its foundation, is about relationships to others or relationship regulation (Sayer, 2005; Rai and Fiske, 2011). In Karkar, collective morals were embedded in a worldview that understood one’s fortune and bad-luck as intimately tied to upholding respect and obedience to leaders and custom, which overrode concerns about individual freedoms that may be at the forefront of moral intuitions elsewhere (e.g. Westernized, industrialized nations) (Haidt, 2012). In contrast, in Ahus, a turn towards instrumental values of fishing (as a means to earn a livelihood and income) and rebellious acts of individualism by young men, were in tension with more community-focused relational values of stewardship held by older generations. As market exchange becomes a more normal way of supporting a family in Ahus, moral intuitions may likewise shift towards greater concerns with the individual and efficiency (Faravelli, 2007). For instance, interaction with markets tends to lower collective moral values, and encourage selfishness (Falk and Szech, 2013).

5.4. Environmental justice at a community scale

Our results emphasize that promoting favourable environmental change requires understanding of recognitional and procedural justice, as well as distributional. Typically, environmental management and conservation policy focuses on distributional justice and favours equality or resource-opportunity costs distributional principles (Friedman et al., 2018). Yet, we found that as coastal developing communities face increasing social and environmental changes, the procedures for governing resources (e.g. customary management) and thus the means to make fair decisions about distribution (e.g. through deliberation), is inextricably connected to recognitional aspects of justice, such as respect, that confer or undermine legitimacy. Recognitional justice is often studied at a larger-scales, such as the recognition of rights and worldviews of indigenous people in conservation policy and discourse (Martin, 2017). However, our findings emphasize a need to attend to concerns about these less tangible, relational aspects of justice, including moral principles like respect and obedience, particularly in non-Western, developing communities, and support the argument that recognitional justice underpins distributional and procedural justice, even at smaller scales (Lecuyer et al., 2018).

However, the heterogeneity of justice criteria in our cases means that there will be no ‘one size fits all’ approach to justice (Friedman et al., 2018). As such, our findings support calls for capturing and understanding plural justice perceptions in different contexts. A key challenge for environmental justice approaches in environmental management and conservation will be aligning investigations of highly locally contingent justice perceptions, with an approach that can be applied more broadly. We contend that the environmental justice framework provides a lens to do so, but requires an empirical approach, that specifically seeks to understand perceptions of justice across the all three interconnected dimensions.

There are limitations to the exploratory study of environmental justice at a community scale. First, eliciting perceptions of justice around local reef and resource governance does not illuminate wider-scale environmental injustices of concern to the community more broadly. For instance, proposed deep-sea mining in the Bismarck Sea may impact the communities of Karkar in the future. In informal conversations many in the community expressed apprehension about the distribution benefits, and concerns that those activities would anger Karkar’s volcano. In addition, future exploratory studies could be strengthened by combining and triangulating the qualitative mixed methods used here, with others, such as focus groups, and with quantitative methods, such as surveys.

Second, studies investigating people’s perceptions of justice will be limited in their ability to identify structural injustices that impact on

people's wellbeing. A key line of inquiry in this domain relates to gender inequalities. For instance, in our study sites marked gender inequalities in the distribution and procedures around coastal resources were not considered unjust by women or men, nor were inequalities in benefits, even when shaped by existing inequalities in wealth and assets. For instance, in Karkar, unequal distributions of benefits were viewed as improper adherence to customary codes of conduct not an issue of injustice. This finding corresponds to much work in anthropology in the Pacific, which finds that ideas around luck, fortune and fishing are often linked to taboos around women's bodies, especially around what women can and cannot do when menstruating or pregnant (Mohamed et al., 2018). Thus these results suggest a need for future environmental justice scholarship to incorporate feminist political ecology theories of subjection, whereby marginalizing norms are internalized and shape the identity of certain people (Nightingale and Ojha, 2013; Ahlberg and Nightingale, 2018).

6. Conclusion

As communities experience the slow shifts wrought by global social and environmental change, and navigate their own paths towards justice, a justice framing can illuminate synergies, tensions and trade-offs. Our findings suggest that pre-defined environmental justice criteria do not capture the recursive, fluid nature of local perceptions. Across our case studies we found similar concerns about the injustice of unequal fishing pressure and destructive methods, but in one case, concerns about people's material needs overrode concerns about non-compliance and unequal costs. In the other case, deliberative decision-making served as a platform for not only negotiating and re-defining the distribution of costs and benefits, but also airing grievances, thereby strengthening recognition of different people's values and concerns. While comparable metrics are useful for broad, comparative studies at a community level, justice criteria shape and are shaped by local context and cannot be easily separated. Identifying underlying moral criteria is a useful step towards analysis of the relational aspects embedded in local justice perceptions. Governing sustainably, with proper recognition of plural values present in changing peopled ecosystems, requires understanding what matters to people through the moral criteria that guide justice perceptions across interconnected dimensions.

CRedit authorship contribution statement

Jacqueline D. Lau: Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Writing - review & editing, Project administration. **Georgina G. Gurney:** Conceptualization, Validation, Supervision, Writing - review & editing. **Joshua Cinner:** Conceptualization, Resources, Supervision, Writing - review & editing, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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